Pit and Quarry

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Vol. 17 CHICAGO, ILL., DECEMBER 19, 1928 No. 6

WHAT'S AHEAD FOR 1929

Comments Extracted From Letters to the Editor

Col. O. P. Chamberlain, Vice President, Dolese & Shepard, Chicago:

"There is nothing in the situation today in Illinois, particularly in the Chicago district, that indicates a probability of any larger demand for crushed limestone than obtained during the year 1928.

"True, building construction continues in the City of Chicago both in the downtown business district and in the residential districts, very much as has been the case for the past three years. The prospect for any increase in road construction, however, seems poor. While Cook County may be quite active in building hard roads, and widening and improving roads already built, and DuPage County has a definite new road program, it is doubtful whether the demand for crushed stone in the Chicago district will be as active as during 1928.

"During the past year there unquestionably has been an overproduction of crushed stone in this district. When one considers that this unneeded and uncalled for volume of crushed stone was produced by running the plants "overtime" with its consequent overtime premium payment of wages and overtime loss of efficiency of workmen employed, there is little doubt that this excess of crushed stone, above the market's requirements, resulted in little if any profit to its producers.

"For many years employers in manufacing industries have given considerable attention to the demands of union labor. Unionized labor has brought about the eight-hour day. This is a time when the crushed stone manufacturer may, with profit to himself, take a leaf out of union labor's textbook and run his plants on an eight-hour basis. Such action means increased efficiency, lower costs and a better demand for stone compared to the quantity of production than obtains under present methods.

"With rational operation of the stone crushing plants, the manufacturers devoting their energies to "quality" rather than "quantity" production, good and profitable business is ahead of us for 1929."

Merry Christmas and Happy New Year

The year of 1928 is passing and again we see Santa Claus hastening toward us. We hope he will bring to each and every one of our readers a Merry Christmas and a Happy and Prosperous New Year.

We trust that each reader will make some good, attainable resolutions, especially one —to read PIT AND QUARRY regularly. Each one may then observe how well we make good on our resolution—to make PIT AND QUARRY more helpful to the industries during 1929.

Adam L. Beck, President, Great Lakes Portland Cement Corporation, Buffalo, New York:

"There is nothing in sight that would indicate but that 1929 will consume a greater amount of cement than was consumed in 1928. There is an average increase in the population and that reflects in the increased amount of cement used each year.

"It would be impossible for this country to consume the capacity production of the cement mills now in operation in the United States, but I do believe that the consumption in 1929 will equal 75 per cent of the capacity of the plants.

"The mill price on cement will be governed greatly by the action of the individual owners of the eighty some odd independent cement companies in the United States and if an orderly curtailment of production is made by the various manufacturers of cement, there is no reason why 1929 should not be a satisfactory and profitable year for all concerned. In fact, I think conditions are ripe, and it is entirely up to the manufacturers of Portland

cement as to whether or not they will have a profitable year's business in 1929."

S. E. Stephenson, President, The Wellston Iron Furnace Company, Jackson, Ohio:

"It seems to the writer that there never was a time when business should prosper more than in the next several years, due to the following conditions:

"With the tremendous growth of this Nation as a creditor after the conditions gone through with due to the World War, and with the United States in an enviable position as far as world gold is concerned, and it being at peace with all nations; with the election over, and with one elected who is a man of national ability and reputation, one who is respected by all nations and one possessing an educated and very sound constructive brain; after President Coolidge's speech on last Armistice night, all of these things tend for a very prosperous business future.

"I see nothing in the near future to do anything except to make for the best business year in history, and that year will be 1929."

Ray C. Noll, General Manager, Whiterock Quarries, Bellefonte, Pennsylvania:

"We have every reason to believe that the volume of business for 1929, so far as we are concerned, will be as good as it has been in 1928 and the year 1928 has been the largest year in our history, both from a volume as well as a profit standpoint. We have made many plant improvements and additions this year which have increased our capacity for producing all forms of lime and limestone to a considerable extent and for this reason we feel reasonably sure that our business for next year will be equal to this year and we are also of the opinion that if the lime and stone business in general is better our business should show a considerable increase for 1929.

"We do not anticipate any better lime business for next year unless we build additional lime kilns as we have virtually been running to capacity on this for our business during 1928 and on the other hand we have every reason to believe that our pulverized limestone business will be very much better for next year because of the additional installations we have made which give us considerably more capacity which has been badly needed.

"The crushed stone business, we believe, should be better next year than it has been this year on account of much local construction work that is contemplated for next year. The fluxing stone business, of course, will be entirely dependent on the iron and steel business and we do not believe there is much chance for further improvements in the iron and steel business, as the companies to whom we have been supplying have been running virtually 100 per cent this year."

John G. Carpenter, Madison Sand and Gravel Corporation, Hamilton, New York:

"I have been unable to find any indications that the demand for sand and gravel during the year 1929 will be less, and it should be considerably greater, than last year. The state of New York has announced an intention to push the construction of grade crossing eliminations and the failure of the old iron bridges to stand heavy traffic has necessitated a great increase in bridge construction. It is inconceivable that there will be any let-up in concrete highway construction. The promise of continued prosperity is bound to stimulate commercial building.

"We must not lose sight of the fact that the use of concrete is still in its infancy. There has been a steady increase in the demand for aggregates for several years and the demand seems bound to grow with ever increasing rapidity. These factors are the outgrowth of public demand and necessity and indicate that 1929 should be a bumper year for the producers of concrete aggregates."

J. A. Pollard, President, Pollard Cyanite Company, Burnsville, North Carolina:

"With reference to business in 1929, we feel that the very best thing that could have happened for the States has happened in the election of Mr. Hoover, and has already brought about a much better feeling in business. We, personally, have already business developments just in the last few days that had been holding up for the last three months that fully convinces us that the business of the country now feels safe to go ahead.

"We feel perfectly free to suggest that we know that 1929 is to be a banner year in business, not any boom business, and we do not want any of that kind, but just real, good, substantial business, such as will be good for everybody."

L. E. Redding, Superintendent, Nickel Plate Sand and Gravel Company, Erie, Pennsylvania:

"Business for this vicinity for 1929 looks very good with an increase of 25 to 50 per cent over the current year. A large road construction program is contemplated, also considerable building."

B. F. Affleck, President, Universal Portland Cement Company

"That conditions in 1929 will approximate those in 1928 so far as the cement industry is concerned, but will involve some serious problems to solve that make the outlook seem less rosy, appears to be indicated at this time.

"The present year seems to have broken all records both as to value of construction contracts awarded and as to the amount of cement shipped. On December 1, figures show that contracts awarded for the first eleven months of 1928 exceeded those for a similar period in 1927 by about $370,000,000, or 6%. Cement shipments for the first eleven months of 1928, according to the U. S. Bureau of Mines, were over 168 million barrels, exceeding those for the same period last year by 4½ million barrels.

"Before citing reasons for the belief that 1929 will approximate this 1928 record, mention may be made of the anomaly that in the face of an increasing demand for cement, its profitable manufacture becomes increasingly more difficult. There are two main reasons for this condition.

"One of these is the continued importation of foreign cement, admitted duty-free and made under labor conditions and a wage scale which would be intolerable in this country. During the current year about 3,000,000 barrels of cement were imported. Foreign manufacturers pay their labor only about one-quarter of that paid by American manufacturers. Transportation costs for shipping cement by water from Belgium, for example, to Philadelphia, especially when shipped as ballast or in subsidized bottoms or both, are less than rail transportation costs from the nearest American plant to Philadelphia. There is no tariff to protect the American cement industry. During the year at least two American plants have shut down, according to accounts in the press, because of this foreign competition. And this affects not only cement producers and labor in cement plants but also railroads, coal mines, quarries, machinery and bag manufacturers and others supplying materials or service to cement manufacturers. To protect American interests, a fair tariff restriction is imperative in order to equalize the difference between foreign and American manufacturing costs and to enable the American manufacturer to continue operation with a fair profit and according to present American standards of living. Even with a growing demand for cement, the American industry cannot prosper unless competition it meets is on an equitable and American basis.

"A second difficulty faced by the industry is its excess producing capacity as compared with demand. For the year ending November 1, 1928, according to the U. S. Bureau of Mines, the cement industry shipped only 74.1% of the cement it was able to produce. In 1928 with a producing capacity of 220 million barrels, it will ship only about 175 million barrels. In other words, it could produce 45 million more barrels than it ships. With the frequent construction of new plants or additions to existing ones, producing capacity continually keeps ahead of demand no matter how that demand increases. The result is that even with maximum plant efficiency, cement manufacturing becomes decreasingly profitable.

"Keeping these problems in mind in order to prevent too optimistic a view, it seems reasonable to believe that construction and the demand for cement may continue in 1929 at about the same rate as in 1928. Reasons for this view are here briefly cited.

"Construction should continue in large volume because business in general, according to authorities who study the matter, promises to be good. There will be no business depression in 1929, they forecast. Construction is an integral part of business as a whole and should go along with it. While there has been great activity in the stock market, with people becoming 'stock conscious' rather than 'bond conscious,' and while money has been firm, no credit shortage for business uses is in prospect, economists say. Adequate funds will be available for all legitimate building, they believe.

"A second reason for believing in a continuance of a large volume of construction is the fact that such a volume seems to be a normal thing. While we have overcome the shortage following the war, current needs, year by year, are so great that continued large scale construction is required. Population increases at the rate of about 15% during a 10-year period. In the next 10-year period we therefore must provide for 18 million more people than we have today. That means millions more homes, more apartments and hotels for them to live in, more plants for them to work in and to produce necessities, more churches, schools and theaters for them to attend, more water and sewer systems for their service, more pavements for them to drive over, more of everything.

"According to one authority, the United

States rebuilds itself every 11 years. For example, if there were 70 billion dollars' worth of construction in use in 1920, there will have been built—between 1920 and 1931—70 billion dollars' worth of construction to replace that which has become obsolescent and to care for new needs. With a continuance of business prosperity, which seems assured, with a normal increase in population and with people demanding more and more modern, convenient and beautiful surroundings in buildings just as they do in automobiles, kitchen equipment and other things, it seems reasonable to believe that the present large volume of construction and use of cement may continue.

"Public works construction also promises to be active in 1929. In case there is a lessening in residential, commercial or industrial building, as some authorities predict, the activity in public improvements may take up the slack. For example, three States alone have already budgeted over $300,000,000 worth of paving for 1929, while the flood prevention work in the Mississippi Valley planned for 1929 aggregates between $300,000,000 and $400,000,000. These two items alone amount to nearly 10% of the value of total construction of recent years. To them can be added pavements, bridges and other improvements in the 45 other states, the increase in modern sewer systems which many cities even of considerable size do not now possess, the nation-wide movement for grade separations, the program of wider roads and streets, construction of railroad terminals, subways and elevated thoroughfares, the speedy development of internal waterways which has been promised by the new national administration, and other public works which, taken together, indicate a substantial building program in this field.

"A final reason for expecting a continued demand for cement is in the new uses that are being found for concrete. For example, concrete block increased 610 per cent in the last eight years, from 50 million to 355 million block. There are reasons to believe that this is only the beginning of a still greater use of such products. Again, concrete floors, which are attractive, permanent, fire-safe and economical, are replacing floors made of other materials. In the same way, just as highways, which formerly were built of other material or not at all, are now more often built of concrete, so city streets more and more are coming to be constructed of concrete. Another new use for concrete is in connection with airports where concrete is recognized by aviation authorities as an ideal material with which to build taxi strips, runways and buildings. Stucco homes made with portland cement, so common in California and Florida, are likewise becoming more popular throughout the country. Reinforced concrete buildings even of great height, ornamental concrete, concrete piles, concrete sewers, roofing made with portland cement and other types of construction call each year for increasing quantities of cement.

"While these new uses for concrete combined with those which have existed before indicate a substantial demand for cement in 1929, it should be borne in mind that cement producers cannot look forward to a profitable year unless some solution is found for the serious problems that now face the industry—excessive producing capacity and large imports due to lack of tariff protection."

J. S. Van Middlesworth, Secretary, Lawrence Portland Cement Company, Northampton, Pennsylvania:

"Up to this date there is no definite evidence of any decline in building demands. Considering the country east of the Rocky Mountains the building contracts awarded up to October 1 have been about 6 per cent greater than for the same period in 1927. While up to October 26, the October contracts are about 7 per cent greater than for the same period in last October. It is our opinion, nevertheless, that sooner or later a decrease in the general building contract awards will come with consequently lessening demand for our products from that source.

"The increasing use of cement in roads, streets and alleys and the contemplated increased use in flood prevention work, hydroelectric developments and the contemplated program of the government will probably take up the tonnage which would be lost through slowing down of building. Therefore, it is our opinion that the tonnage movement of cement in 1929 will be approximately the same as in 1928 with perhaps a slight increase."

W. H. Gemmer, Business Manager, Gemmer & Tanner, Houston, Texas:

"With reference to trade conditions for 1929, will say that we are very optimistic on this line for Houston and vicinity and are sure that our 1929 business will be better than any heretofore, although we have had a nice business in 1927 and 1928."

W. S. Keller, Manager, Empire Sand and Material Company, Marshalltown, Iowa:

"With reference to the outlook for business in 1929, would say that so far as Iowa is concerned, as you are no doubt aware, the people of Iowa voted $100,000,000 bonds, which will mean a lot of good roads in Iowa. This will naturally be a big help to business, and Iowa is in a very healthy condition and it is our opinion that building in general will be fairly good and that material men have a very promising year ahead in 1929. This opinion is based on a study of the general conditions in Iowa and coming in contact with its interests in building."

J. F. Schroeder, Secretary and Treasurer, Linwood Cement Company, Davenport, Iowa:

"It is rather difficult to form any reliable opinion for the reason that the building operations in our vicinity have been very slow on account of the agricultural situation being bad for a number of years and it is not definitely known when any improvement in this connection may appear and, on account of Iowa being an agricultural state, this condition reflects in all business. However, since about a year and a half ago, when some counties voted bonds for paving, our crushed stone business has been showing an improvement and it is our opinion that in 1929 our shipments will be about 10 per cent greater than 1928."

Paul M. Nauman, Secretary and Treasurer, Dubuque Stone Products Company, Dubuque, Iowa:

"In Iowa, as you know, on November 6th a bond issue was voted on favorably, but that does not indicate anything for the producers because contractors bidding in Iowa are beginning to operate their own plants, and in that way the established producers are suffering. We don't know if this condition is going to continue but, if so, the bond issue is a detriment to the established producer instead of a boon. Construction work is slow and for that reason we don't hold out for a very prosperous year in 1929."

John C. Best, President, The Best Brothers Keene's Cement Company, Medicine Lodge, Kansas:

"At this time I see no reason why 1929 should not be a normal year and we are basing our advertising and selling appropriation for the coming twelve months upon that belief. In our own particular business, which is that of manufacturing gypsum products, I believe 1929 will be better than 1928, as during the present year prices on some lines have been depressed below the actual cost of manufacture."

Poole Maynard, Industrial Geologist, Atlanta, Birmingham and Coast Railroad Company, Atlanta, Georgia:

"Our work is directed to industrial development in our territory. After the election tomorrow, we believe that business will gradually pick up, regardless of who may be elected. We base this on:

"Business conforms to cycles and we have had depressed business conditions for some time.

"As the political turmoil subsides, attention will be given to new business and the eyes of the Nation are on the South. Whenever such Companies as the Goodyear Tire and Rubber Company decide to put up a plant to cost $25,000,000 in the South, it is good evidence that they expect the South to prosper.

"We expect to increase our own business, namely the hauling of freight, by the development of our raw materials into manufactured articles to meet the requirements of the markets of the South."

J. A. Benell, President, The Crystal Silica Sand Company, Los Angeles, California:

"As far as our business is concerned, it is our opinion that our business for 1929 will be upwards of 25 to 50 per cent in excess of this year's business. We produce a high grade silica sand, processed for the different industries interested in this section, ranging from the highest grade stucco materials to glass sand, blast sand and ceramic sands. The industrial growth of the Pacific Southwest is particularly reflected in the natural movement and decentralization of people and industry westward. We have a financial and economical situation in this territory manifesting an influence in the establishment of industries out here that will constantly keep the basis lines of progression on the increase. It is only basic industries that will come here, determined upon handling the resources and other raw materials from an economical production standpoint. We are making additional equipment installations, preparatory to an increase in daily tonnage production of upwards of 200 tons daily, and our situation for 1929 is very encouraging."

J. A. Rigg, Secretary and Treasurer, Acme Limestone Company, Alderson, West Virginia:

"We see nothing on the horizon at the present time to warrant anything but a most optimistic view of prospects for a good year, not only in our line, but in all lines for the year 1929."

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Emerson B. Ehernberger, Louisville Rock, Sand and Gravel Company, Omaha, Nebraska:

"Since our next president will be the Hon. Herbert Hoover, I shall attempt to give some of my views upon the future outlook. I believe the sand and gravel business is on the eve of a great prosperity. Mr. Hoover is the first engineer to be elected to office since George Washington. I also believe his engineering experience will aid the upper Mississipi water ways to a great extent in development. This will bring about a big demand for sand and gravel in the next five years. Road gravel contracts in Nebraska are under way now. Iowa has voted a $100,000,000 issue paving bond. Western Iowa has no road gravel, hence, the producers in eastern Nebraska will get much business. The Nebraska Good Roads Association in sponsoring a move for a 4c gas tax, 2c addition to our present tax, this 2c to be used for paving. This will be a big item to the sand and gravel industry. Omaha, the greatest sand and gravel user in Nebraska, is well on its way to prosperity. Building is on the increase. Some large buildings are now under way, such as the $3,000,000 art memorial, $1,500,000 hotel, and many others. Lincoln has a good substantial boom on also. A $700,000 bridge is contracted for at Platsmouth. At Blair a large bridge is under construction. Omaha and Council Bluffs are discussing the erection of a no toll bridge. The coming years shall see prosperity that has never been seen in the West."

Clyde Piper, Secretary and Treasurer, Connersville Gravel Company, Connersville, Indiana:

"We have had a very good business for the year just closing with a part of season on twenty-four-hour production. The outlook for the coming year is very good, as we see it. The factories are enlarging plants to increase production in our territory and the business conditions appear good in all lines. We look for the coming year to be better than the one just closing in all lines of business."

Harold B. Weston, Sales Manager, Weston Sand and Gravel Company, Logtown, Mississippi:

"We expect to have a very good year's run. Louisiana has already passed a road bond issure that should get under way early in 1929 and we have every reason to expect Mississippi to do the same in the near future. It should give us a very substantial business before 1929 is well under way. With the orders we now have on our books, we expect to be kept busy until these road programs are started. Next year will certainly be better than 1928 has been, though we have run full time since June and will run out the year on full time. Commercial buildings in this section have slowed up, as well as the fast municipal program, but with the anticipated state work, we are looking for a good year in 1929."

J. E. Carroll, J. E. Carroll Sand Company, Buffalo, New York:

"We anticipate that the demand for concrete aggregates in Western New York for the coming year will be greater than the year just coming to a close. All indications point to an increased amount of concrete highways.

"The State Highway Department and the County Departments in the extreme western end of the state are making plans for more roads—wider roads—heavier roads. This will assure the producers in this district of increased production over the past two or three years. Present indications are that the price will be better than that in 1926 and 1927."

I. W. Wortman, President, North Jersey Quarry Company, Morristown, New Jersey:

"Present indications for this territory lead us to believe there will be just about the same amount of business in 1929 as we enjoyed in 1928, and the same general conditions should prevail. The 1928 season is closing just slightly ahead of 1927. This shows that we are enjoying a normal, consistent growth in this territory, but the demand has not yet reached the capacity of the numerous plants serving this territory."

American Mineral Products Company, Inc., Hartford, Connecticut:

"As near as we can judge, we believe 1929 will be a somewhat better Feldspar year than present. 1928 has been a very satisfactory year with us but we believe we can see reasons for an increase in consumption next year. Acting upon this belief, we are constructing a modern grinding mill at Cold River, N. H., that will be equipped with the latest type mechanical equipment and will have a capacity of 200 tons daily. We hope to have the mill in operation by May 1st, 1929."

C. T. Hurd, Manager, Tri-O-Lite Products Company, Carlin, Nevada.

"We wish to say that at the present time our business prospects look very good. We are anticipating some changes in our equipment that will materially increase our production."

M. M. Bamberger, President, Interstate Crushed Stone Company, Springfield, New Jersey, says:

"I believe that the demand for crushed stone in our territory during the coming year will equal, if not exceed, that of 1928, which has surpassed any previous year. Prices held firm during 1928 and I believe the same condition will prevail in 1929. As a matter of fact, the outlook is very good for several years to come."

E. H. McEuen, Lime Engineer, Lindsay, California:

"Like most other sections of the United States the problem of the lime industry in the Pacific Coast Region is one of overproduction. Probably a more correct expression of the situation would be to describe it as an underdeveloped market. In some respects the industry in the Pacific Coast states is now passing through the same condition that applied to the middle west and eastern states several years ago. For instance, much is yet to be done toward educating lime users to the varied uses and advantages of hydrated lime. Even many dealers are found who are uninformed about many of the uses for which they should recommend lime in any form. Wide and varied ideas among buyers for both the building and chemical industries as to standard requirements create much confusion among producers as to what is considered standard.

"Intelligent co-operation among lime manufacturers on these problems in connection with a wise, concerted program of instruction which would make contact with every potential lime buyer will go a long way in helping the industry forward. Certain recent developments would indicate that most if not all of these things will be worked out during the coming year. To those producers who have plants equipped with modern appliances and who are in a position to furnish a high quality product, the coming year promises to yield a greater volume of business at a more comfortable margin of profit than the past year. However, it is my opinion that we can not hope for a sudden surge of prosperity, but the improvement will be a slow process and, in all probability, the total tonnage sold in 1929 will not exceed that for 1929 by more than 10 per cent."

F. F. Dickmann, Eastern Clay Products, Inc., Mount Jewett, Pennsylvania:

"In reply to your recent questionnaire, we are pleased to forecast excellent prospects for our business during 1928. Our product is a high grade fire clay, which is used as a rebonding agent for molding sand."

C. A. Starkweather, President and Treasurer, Lannon Quarries Corporation, Beaver Dam, Wisconsin:

"There is no question but that 1929 is going to be one of the busiest years in industrial activity that this country has ever seen. The writer speaks from several angles, being in close touch with building material business, in both quarry and forest products, also in the iron industry at the foundry end. Without being overoptimistic, we predict slightly higher prices on building material and, in some lines, shortage of skilled labor. A decided atmosphere of confidence seems to have replaced the slight doubt of a few weeks ago. This is evident from day laborers all the way up through dealers, contractors, manufacturers and bankers. Every business activity in which the writer is interested is making definite arrangements to take care of increased business."

Edmund J. Copps, Jr., The Metro-Nite Company, Milwaukee, Wisconsin:

"According to all present indications, our company looks forward to a very successful business year in profits, as well as sales. Our Metro-Nite is sold largely to the paint and building materials trade and both of these industries look ahead to a big year in their lines. The benefits of our product are well known in each line and the demand for them comes automatically. The fact that 1929 is the first year of the new presidential administration should have no effect whatsoever on the business conditions of our country. Many years ago this belief prevailed, but since then we have learned that such a statement was old fashioned and that industry must progress with disregard for all political affairs. The willingness with which our old customers have contracted with us for the coming year and, in most cases, for a larger amount of material than which we have furnished them in other years, and the many new accounts that we have opened of late prove beyond all doubt that 1929 will be a banner year for the Metro-Nite Company."

J. W. Sanders, Standard Gravel Company, Inc., Antoine, Arkansas:

"For the reason that we depend largely on road construction in the states of Louisiana and Arkansas, and the financial condition of the Highway Departments of these two states at the present time, the outlook for business for us is not so good. However, municipal paving and general construction in other lines will likely continue to be about the same as it has been during 1928."

Emil F. Rotering, Commissioner, Trempealeau County Highway Department, Whitehall, Wisconsin:

"In regard to the outlook for 1929, there seems to be no question but that we will have a very prosperous future. The election of a Republican president seems to bring about a general prosperous condition. The road program for 1929 will be as large as any construction season we have had in the past. This area consists mostly of agriculture and the farmers have been quite prosperous the last few years and, with this improving slightly as time goes on, land values will increase considerably in this section."

Col. L. S. Powers, Menard, Texas:

"On the subject of future business, and expressing my views after the election, I will say that if Mr. Hoover does not carry out the plans he suggested during his campaign, the most wonderful majority ever given a president will be very much disappointed, and when a man can carry Kentucky by the majority he did, then put Texas in the Republican list, I say he should be able to do most anything he promised to do. I am here in Menard, Texas, opening a Gypsum Mine that runs 99 87-100 per cent pure gypsum and have an inexhaustable supply of same. I feel that in view of the confidence the people have in the administration which they will have for the next four years, this business, as well as all other businesses, should prosper.

"The Gypsum Industry has been in war for the past year and I see no reason for this, as there is a steady demand for gypsum products and they need not war among themselves. However, this is the case and I hope some gypsum producer will state the reason through the Pit and Quarry. The Pit and Quarry gives facts and I hope that all who have the opportunity may avail themselves and state their views as asked for by this liberal journal."

W. S. Keith, Manager, Standard Gypsum Company, Seattle, Washington:

"The outlook in Seattle and the entire State of Washington in the construction line is very bright. Seattle has $20,000,000 worth of new construction now on the architects' boards. The building in Seattle for 1928 will be about $35,000,000 and this figure should be passed in 1929. Building construction has also been particularly good in Spokane, Pullman, Walla Walla and Billingham, and about normal in Yakima, Wenatchee, Aberdeen, Hoquiam, Laconia and Olympia, and will probably be better next season, especially in Spokane, Laconia and Billingham. The new $2,000,000, 3,000-barrel cement plant of the Pacific Coast Cement Company, located in Seattle, will be in operation in February. This will give the State six cement plants with a daily capacity of about 18,000 barrels. Business is good."

C. V. Ray, President, Coon River Sand Company, Des Moines, Iowa:

"We are expecting a slight increase in business along some lines, especially in the road building."

E. C. Rockwell, Treasurer, Brandon Rock Products Corporation, Middlebury, Vermont:

"We expect about a normal use of our terrazzo chips in 1929. The use of domestic chips increases about 15 to 20 per cent a year as terrazzo increases in popularity and the users turn to domestic stone and away from imported on account of the price, uncertainty and shipping delays on the imported materials. We expect our agricultural limestone business to double in 1929, as the farmers in this territory are being educated to the use of this material. Our chicken grit business remains about the same. Our cast stone aggregate business runs about the same, but we think the use of cast stone is increasing so that ought to increase."

Philip Penrod, Jonesville Gravel Company, Fort Wayne, Indiana:

"With reference to the outlook for business in 1929, it is our opinion we will do a larger business in 1929 than in any year of our history."

M. A. Neville, Vice President and General Manager, Western Indiana Gravel Company, Lafayette, Indiana:

"Our business for 1928 was the heaviest in our history, but prospects for business in 1929 are better than they were this time last year, so we feel there will be substantial increase in business during next season."

B. F. Coggins, Atlanta, Georgia:

"The granite business has held up unusually well throughout the entire year. We have had a considerable increase in our volume of business over any previous year. I see no reason why the year of 1929 will not be a better year than 1928, providing every man will look after his business. It is our intention that the Georgia Granite Corporation at Elberton, Georgia, will build a plant something like 50x400 during the year of 1929, providing business conditions will warrant it. This plant will be used for handling building stone altogether."

W. C. Diggs, Jersey Limestone Quarries, Inc., Hamburg, New Jersey:

"At the present time, the outlook for 1929 seems much brighter than it has been in 1928. There seems to be much better tone in the iron and steel business at present than prevailed the first one-half of this year. If these conditions continue through 1929, our business will show a much larger volume than we have been able to show for 1928. There has been a very marked improvement in our business since the 15th of August of this year and it seems to be the general opinion that this condition will continue on through the balance of this year into 1929."

F. W. Kuster, Kuster & Waterbury, Corona, California:

"In my opinion the business outlook for 1929 in the sand and gravel business is very good and would judge that the gross business will be some greater than in 1928, but not over 25 per cent. Building activities are increasing, but in a small community, this is not of big volume. Our largest volume of business for the past year has been in road work, bridges, and in the building of the famous Lake Norconian Club, which, we understand, will be the largest institution of its kind in the United States. This one project has used an average of 4,000 yards of sand and rock per month for the last eight months and will not be fully completed until some time next year. We expect to serve a slightly larger territory next year and, with that in view, we have made arrangements to increase our capacity about 50 per cent."

W. P. Varian, President, Stamford Local Material Company, Inc., Glenbrook, Connecticut:

"We consider that prospects are extremely bright for a very prosperous business year for 1929, especially in this section in which we are located, which is now enjoying a healthy growth in the building trade, due to the overflow from Westchester County, New York, which adjoins us on the south and west. Through improved methods, both in the manufacture and the handling of our products, we have been enabled to render a service to our customers, which has stepped up our gross sales about $10,000 for this present year, with a corresponding, satisfactory, proportionate increase in our net profits and, with an excellent start in manufactured surplus materials already on the ground, we feel justified in anticipating an even better year for 1929.

"Due to our limited acreage and the big jump in land values in this section, which makes it prohibitive to endeavor to buy a new gravel pit, we are obliged to conserve our present gravel holdings, and in the future look more closely to our retail market with its finer materials and higher prices, and avoid where possible sand and gravel orders in bulk. In this manner, we can maintain our present pace for about five years, grading and putting in our roads and water lines as we go along, and gradually swinging into the building construction game, which we already have found quite profiitable as a side line. Contractors and builders with whom we have come in contact since election seem highly optimistic as to the future and even in the past two weeks we have noted a marked improvement in the usual late fall business and are booking orders for winter delivery, which has never happened before."

L. D. Stanton, Plant Engineer, P. J. Weisel, La Habra, California:

"The last half of 1928 has seen some improvement in the business conditions on the Pacific Coast and, while I do not look for nor want to see any "boom times" during 1929, I believe that all indications point toward a steady and healthy improvement. Unemployment is low and wages are good and, with the increasing tendency of Eastern Manufacturers to establish branch factories here, I cannot see but what both Capital and Labor will benefit. There are several large construction jobs starting soon which will take huge quantities of building material; new uses for our particular material, silica sand, are being developed which, when taken with an ever-increasing demand, can only mean one thing: that 1929 will be a banner year for our business and for business in general throughout the Southwest."

H. B. Ewing, American Mineral Products Company, Inc., Hartford, Connecticut:

"As near as we can judge, we believe 1929 will be a somewhat better Feldspar year than present. 1928 has been a very satisfactory year with us but we believe we can see reasons for an increase in consumption next year. Acting upon this belief, we are constructing a modern grinding mill at Cold River, New Hampshire, that will be equipped with the latest type mechanical equipment and will have a capacity of 200 tons daily. We hope to have the mill in operation by May 1, 1929."

W. J. Sprow, General Manager, The Wagner Quarries Company, Sandusky, Ohio:

"Beg to advise that we can only speak for the section of the country which we serve,

but, in our opinion, the prospects are very bright and we look for a firm market and a steady demand for stone throughout the year. We expect business to open up earlier than in previous years. There are several large projects in this area which will require a large amount of crushed stone and this will tend to make the market rather firm and, at the same time, give a good demand for our product."

F. F. Farrar, Secretary and Treasurer, The Cohutta Talc Company, Dalton, Georgia:

"We have great confidence in believing that Mr. Hoover will give us a sound business administration and we see no reason why we should not look forward to improvement and four years of good business."

Arthur S. Goetz, Vice President and General Manager, Thurber Earthen Products Company, Fort Worth, Texas:

"All we can say in reference to business prospects for 1929 is that we expect the year to be at least as good as 1928."

Colby Gravel Company, Granville, Illinois:

"About all we can say at this time in regard to business for next year is we most always have more than we can do and see no signs of a change for this next year. We just purchased additional acreage so are expecting the usual amount of business at least."

Warner Moore, Jr., Secretary and Treasurer, The Powhatan Lime Company, Richmond, Virginia:

"Now in regard to business, I cannot see any special improvement to come in 1929. In the lime business I can answer in a very few words: It is overproduction. The supply is far greater than the demand. It is what you might term a buyer's market and this being the case, when manufacturers can't sell their product, they think somebody is underselling them and down it goes. The outlook is anything but encouraging. The cotton crop, you might term in the South a failure. Land heretofore that has produced a bale of cotton to the acre today I don't suppose would average a bale to four acres and some of it is not worth picking and is not being picked. This is also overproduction. The planters are in a bad way. They cannot pay their factors and distributors and these distributors likewise cannot pay the merchants from whom they buy."

R. M. Richter, Sales Manager, Indiana Limestone Company, Bedford, Indiana:

"We analyze the situation throughout the United States and Canada with extreme care and try to stay in touch with it at all times. Having sales offices in twenty-three states, we feel that the reports that reach us from that source are reasonably dependable. On basis of the foregoing, should say that the general outlook for 1929 is for a distinctly better business year than 1928 will prove to be. So far as our own direct construction activities are concerned, no extensions or improvements of consequence are contemplated. Improved operating methods and resultant increased efficiency established within the last two years, or since the formation of this company, have given us a substantially increased production without any capital expenditure."

W. Leonard Caten, Vice President, W. H. Loomis Talc Corporation, Gouverneur, New York:

"Our company feels that business conditions as a whole for 1929 are very secure. Under Herbert Hoover's leadership this country, during the next four years, should experience an unprecedented era of prosperity. His ability as a leader and organizer is undisputed and, with the co-operation of his constitutents, which was assured at the polls November 6th, we cannot feel other than optimistic for the business of our country during 1929, 1930, 1931 and 1932."

J. D. Hartman, Manager, J. L. Hartman Company, Hollidaysburg, Pennsylvania:

"We expect very little change if any in business conditions insofar as it relates to our several industries during the year 1929. We have had a very fair year throughout 1928 and the prospects for the coming year are very good for the fact that the steel industry, upon which we are directly dependent, is now operating on a basis of 80 to 90 per cent capacity in the district which we are serving with our raw material, the J. L. Hartman Company, Ganister Rock and Calcium Products Company, Open Hearth Chemical Limestone."

Bart Anderson, Anderson & Hubert, Buffalo, New York:

"I believe we are going to have the biggest and best business this whole U. S. A. ever experienced. Erie County is going to spend $20,000,000 on good roads. Buffalo City is spending $12,000,000 on city buildings. Besides, there are big harbor improvements. Subdivisions are started on all sides—no limit to them."

Reed C. Byre, Vice President, Charles Warner Company, Wilmington, Delaware

"There seems to be every indication that the prosperous conditions enjoyed generally throughout the country in 1928 will continue through 1929.

"We are hoping that the lime industry will partake of this prosperity to a greater extent than it did in 1928. There seems to be some indication that the producers are awakening to the fact that they are solely responsible for the depreciated condition of the industry and that the extent of improvement will be measured directly by their willingness to co-operate and to encourage and support, with time and money, a constructive program for the advancement of the industry as a whole."

Ralph L. Crockett, Superintendent, Maine and New Hampshire Granite Corporation, Redstone, New Hampshire:

"The writer's opinion on so great a subject is of little value to you or to your readers. However, he has always chosen as an inspiration that great word HOPE in all of his undertakings. Let us all hope that 1929 will bring success and prosperity to the manufacturers and their workmen."

C. P. Biesanz, President, Biesanz Stone Company, Winona, Minnesota:

"Mr. Hoover is an advocate of good roads and gravel companies will be benefited by his election."

H. D. Ruhm, Vice President, Ryhm Phosphate & Chemical Company, Mt. Pleasant, Tennessee:

"We are glad to advise that our prospects for increased business for 1929 seem very good and we look forward to at least the same increase over 1928 which this year has shown over 1927. Much, of course, depends upon the conditions of our farmer customers, but we feel they will enjoy a good year, and, of course, in that case we will also."

R. D. Smith, Columbus Sand Company, Columbus, Georgia:

"We expect an increase in our business of 100 per cent during 1929. The outlook is better for next year than it has been in two or three years."

G. B. Livingood, Advertising Manager, Traylor Engineering & Manufacturing Company, Allentown, Pennsylvania

"The year 1928, just closing, has witnessed most important advances in all branches of the rock products industry, but none so revolutionary as in the business of making Portland cement, which is logical, seeing that this commodity is the keystone of all construction.

"The reasons for the enormous strides made in the cement industry are manifold, but the most important has been the sharpening of competition among domestic producers, due to a growing tendency toward over-production, to which the menace of low priced foreign cements has added emphasis.

"This condition has developed a situation wherein has come keen realization on the part of builders of new plants that the Nth degree of efficiency and economical production are requisite to successful venture into the field, and existing makers have no less clearly seen that old methods must be discarded and only most modern equipment may be employed if they wish to remain in business—for even when the question of foreign-made cement has been disposed of there will still remain the fact that new construction has forced production above the actual and potential consumption point to a degree that only the fittest can survive.

"The logical result has been in ample evidence throughout the year—a more than normal number of new plants have been built or are building and in addition a very large percentage of the older cement factories have strenuously forwarded programs of improvement and enlargement. As a consequence, there has been an unprecedented volume of cement-making equipment business which has kept the makers thereof free from concern for at least the near future."

V. D. Demarest, A. G. Schoonmaker & Sons, Inc., New York City:

"We have in mind the purchase of new premises and the erection of a suitable steel building for housing our warehouse and shop in the next year or two. We are optimistic regarding the future industry of this country and are willing to back our judgment by preparing to carry on the increased measure of business to which we confidently look forward."

J. L. Westenhaver, Vice President, Productive Equipment Corporation, Chicago:

"We gave serious consideration to the advisability of organizing a new company, appreciating the grave danger should a depression exist, and our survey was so encouraging that we decided to go ahead. You can, therefore, realize that the coming year, in our opinion, should be a continuance of the past two years."

Gerard Swope, President, General Electric Company, Schenectady, New York:

"The electrical manufacturing business for 1928, on the whole, has been quite satisfactory, with an increase in volume of about seven per cent. It is remarkable that the use of electric current in the homes and in the factories continues its high rate of increase from year to year. The 1928 rate of increase is about eight per cent and, as stated last year, this is becoming one of the best indices of general and industrial conditions in America. Basic economic conditions are sound, inventories not unduly expanded, credits and collections satisfactory, earnings of labor are high, and employment steady, all of which presages a favorable outlook for 1929."

E. Podlesak, President, General Automotive Company, Lincoln, Nebraska:

"We feel sure that the prospects for the non-metallic mining industry here look better. It is our opinion that the State Legislature which meets after January 1 will raise our gasoline tax at least another cent per gallon and that the road program in the next two years will be greater than it has ever been before. If we are favored with a crop, we believe the country will be extremely prosperous."

C. C. Miller, Sales Department, Manitowoc Engineering Works, Manitowoc, Wisconsin:

"From observations made during the past two months throughout the middle west and eastern states, we are of the opinion that the year 1929 will show business conditions far in excess of any year that we have experienced during the post-war period. The recent election shows that businss generally has confidence in the administration, and in the ability of the president-elect. This, of course, is a big factor in the promotion of sound business principles and inspires confidence which, after all, is the foundation for a continuation of our present prosperity."

E. I. Du Pont De Nemours & Company, The Explosives Department:

"We anticipate a business in volume on explosives comparable with that of 1928. The year 1928 was very satisfactory and was only slightly below the volume for 1927, which was a banner year. The Department expects that the operations of permanent units of trade are to be normal. The expectations of railroad improvements and public works are in excess, from the point of view of explosives requirements of past years. The Explosives Department expects to spend a considerable sum in providing for improvement in manufacture and additional facilities for changed methods, but not for any marked increase in the total capacity of the finished product."

Alf. Cooper, Alf. Cooper & Co., Fort William, Ontario:

"As for our district in particular, we really look forward to large increase in business from our outputs, which have been small up to the present time on account of exploration work and testing out work. Developments here are taking place very rapidly, large buildings are under construction, many financial firms are spending millions. Mining situated within close proximity to the city are progressing and very valuable and high grade ores—nickel, silver, iron, gold, platinum, and lead have recently been discovered, making a marked change in the appearance of development. Hundreds of dwelling houses have been erected and not a vacant place in the city to be had. A heavy building program is lined up for 1929 and we look for the best year in the history of the city and district."

Charles Edison, President, Thomas A. Edison, Inc., Orange, New Jeresey

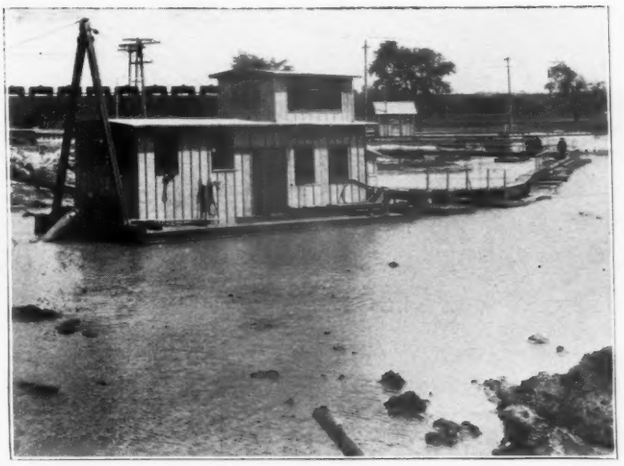
"The Edison Industries operate on a budget, and we are at present engaged in preparing our budget for 1929. Among other things, we base our predictions for 1929 on what our experience has been in 1928. The Thomas A. Edison Industries manufacture and distribute a diversified list of products: Edison Radios and Radio-Phonograph combinations, Edison Phonographs and Records, Edison Portland Cement, Edison Storage Batteries, Edison Primary Batteries, the Ediphone (Mr. Edison's Dictating Machine), the Edicraft Automatic Electric Toaster, the Edicraft Siphonator (a new way of making coffee), Juvenile Furniture and other wood products, and you will therefore understand that, while conditions in one industry may be excellent, in another they may be only fair.

"We have recently entered the Radio field and the public's response to our product thus far indicates a good volume of business in 1929. We have met the same response with two of our other new products, the Edicraft Automatic Electric Toaster and the Edicraft Siphonator.

"With particular reference to conditions in the Cement Industry, as we see it, we are again looking forward to a good year. We see nothing in the offing at present which would indicate a diminished consumption."

SAND AND GRAVEL PLANT DEVELOPMENT IN 1928 EXEMPLIFIED BY THESE FOUR PLANTS

THE year 1928 has been one of great activity in the sand and gravel industry, due largely to the amount of highway and building construction that took place throughout the country. Many new plants of all types and sizes were built and hundreds of old plants were reconstructed or enlarged. We have endeavored to keep our readers informed of the latest developments and practices in sand and gravel plant operation through the medium of articles describing these typical plant operations. These plants were of such varied types and were designed to meet so many different conditions that we would not attempt to select any one plant as the model sand and gravel plant of 1928. We have selected four plants, however, which are typical of the present trend in plant design, each of them being a splendid example of its type, and are presenting a brief description of each.



Dredge at Morton Plant

Morton Sand and Gravel Company

The Wayne, Illinois, sand and gravel plant of the Morton Sand and Gravel Company is a splendid example of 1928 design for a plant using the dredging method. The plant itself is a straight line unit with a splendid combination of pumps and belt conveyors and is one of the few in existence using sumps for draining the material after it is discharged from the pipe. The location is about 30 miles west of Chicago and consists of about 400 acres of low land. The deposit contains about equal proportions of sand and gravel. A small stream running through the property was dammed up for the original pond. The plant was designed and the conveyors, screens, sand classifiers, bin gates, etc., were all furnished by the Stephens-Adamson Manufacturing Company.

The dredge has a wooden hull 20 by 40 feet, built in three sections. A 12 inch Morris centrifugal pump, driven by a 300 h.p., 440 volt General Electric induction motor, does the pumping, and a 3 inch Morris pump, driven by a 10 h.p. General Electric motor, is used for priming. The suction line at one end of the dredge is raised and lowered by a three drum Flory hoist operated by a 40 h.p. General Electric motor. The 12 inch discharge line runs above the floor of the dredge and out the rear to two sumps on shore. The line is supported by both wooden pontoons and steel barrel pontoons.

The discharge can be delivered to either of the two sumps by a Y, each branch of which is equipped with a valve control. The sumps are curved and are located so that a clamshell at the

General View of Morton Plant

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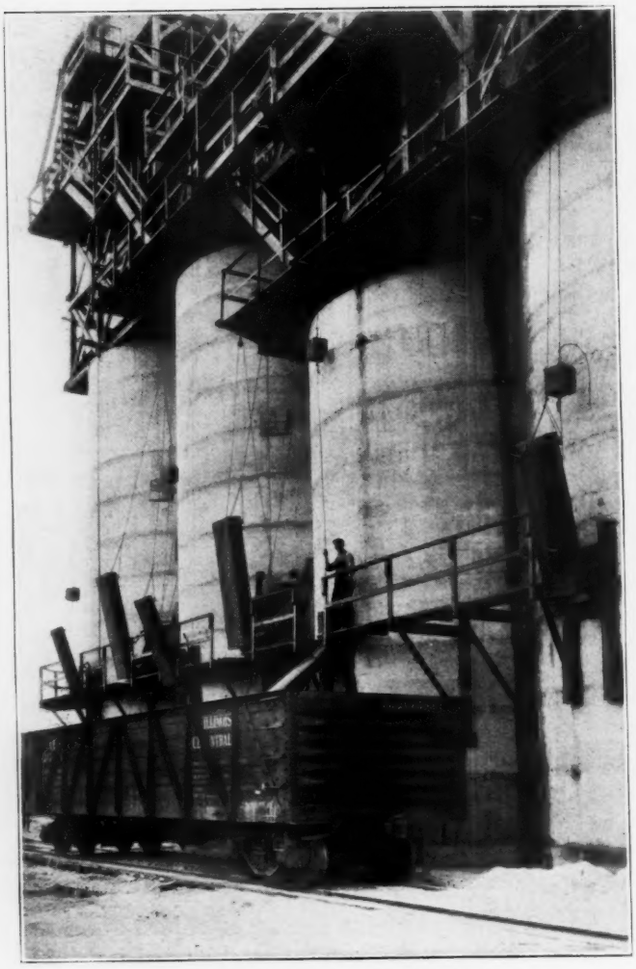
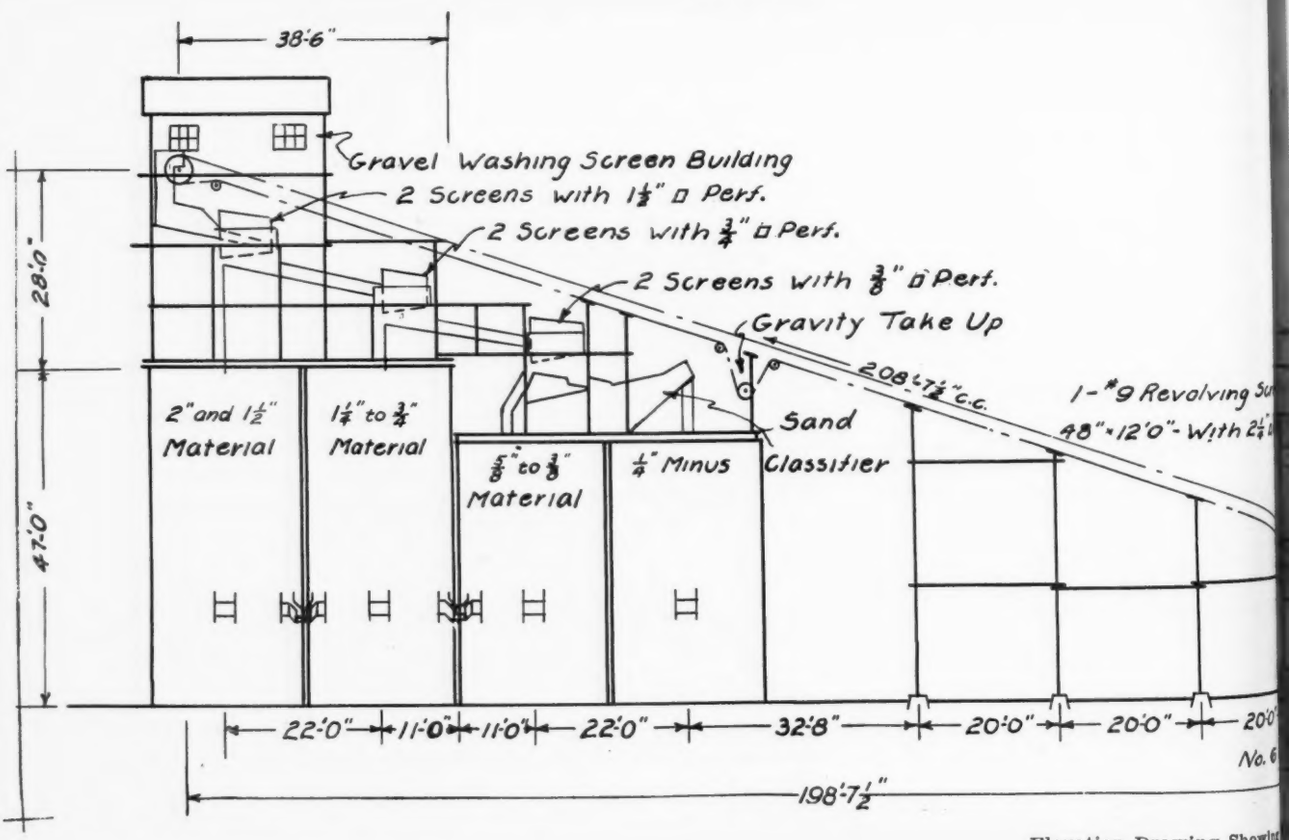


Close-Up of Bins at Morton Plant

center can cover the greatest possible area. This system, in addition to eliminating much shutting down of the pump, also facilitates drainage. The water drains to a sluice 36 inches wide that delivers back to the deposit. A sand and gravel filter with a weir gate control built in the deposit controls the return waste from the sump.

The shovel, which is a 50B Bucyrus equipped with a 1½ yard clamshell bucket and a 60 foot boom takes the material from the sump and discharges into a concrete hopper with a pipe grating. A Stephens Adamson gate controls the discharge to an underground 30 inch Stephens Adamson belt conveyor on 47 foot centers, which discharges into a hopper with sliding gate control. This in turn discharges onto a 30 inch inclined belt conveyor on 143 feet 9½ inch centers, with a Stephens Adamson gravity take-up, which delivers the material to the crusher house.

The conveyor feeds into a 4 by 12 foot revolving scalping screen with 2½ inch square perforations. The oversize drops to an Allis Chalmers No. 6 gyratory crusher, which discharges onto a 24 inch inclined belt conveyor on 81 foot centers. This conveyor discharges into a hopper which feeds back onto the conveyor to the scalping screen. The throughs from the screen are delivered to a 30 inch inclined belt conveyor on 208 feet 7½ inch centers, also equipped with a gravity take-up, which delivers the material to the washing and screening plant, which is built on top of four concrete storage bins.

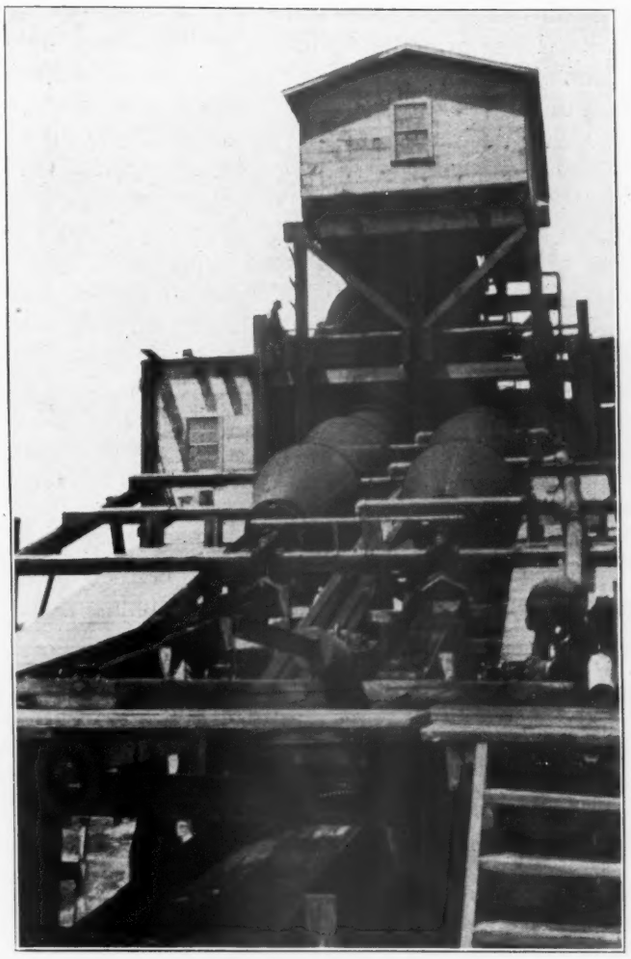


Elevation Drawing Showing

This plant is a dual system so arranged that one-half of the plant can be shut down when necessary. The material discharges directly into the first of three pairs of Gilbert revolving screens, which have 1½ inch square perforations. The 1½ inch material drops to the bins while the throughs are chuted to the second set of two screens which have ¾ inch square openings. The ¾ to 1½ inch material drops into the second bin while the throughs go to the third pair of screens which have ⅜ inch square perforations. The oversize here goes to the third bin and the throughs, together with the water, go to a Stephens Adamson drag type sand classifier which delivers the sand ¼ inch and finer to the fourth bin.

The four circular concrete storage bins are each 22 feet in diameter, the first two being 47 feet and the other two 35 feet in height. Each bin is equipped with a spout on each side with 24 by 18 inch Stephens Adamson quadrant gates. Bins one and two and two and three have mixing spouts so that four straight sizes and two mixed sizes can be loaded. Two side tracks, one on each side of the bins, connect up to the Illinois Central railroad which runs by the plant.

Two Seaverns bins of 50 cubic yard capacity each have been set up since the main plant started in operation, one of them being used for sand and the other for gravel. These are each equipped with batch hoppers for loading into trucks. Cars are run up on a siding alongside the bins and unloaded by an American Hoist and Derrick crane with a 1 yard bucket, either into the bins or to stockpiles.

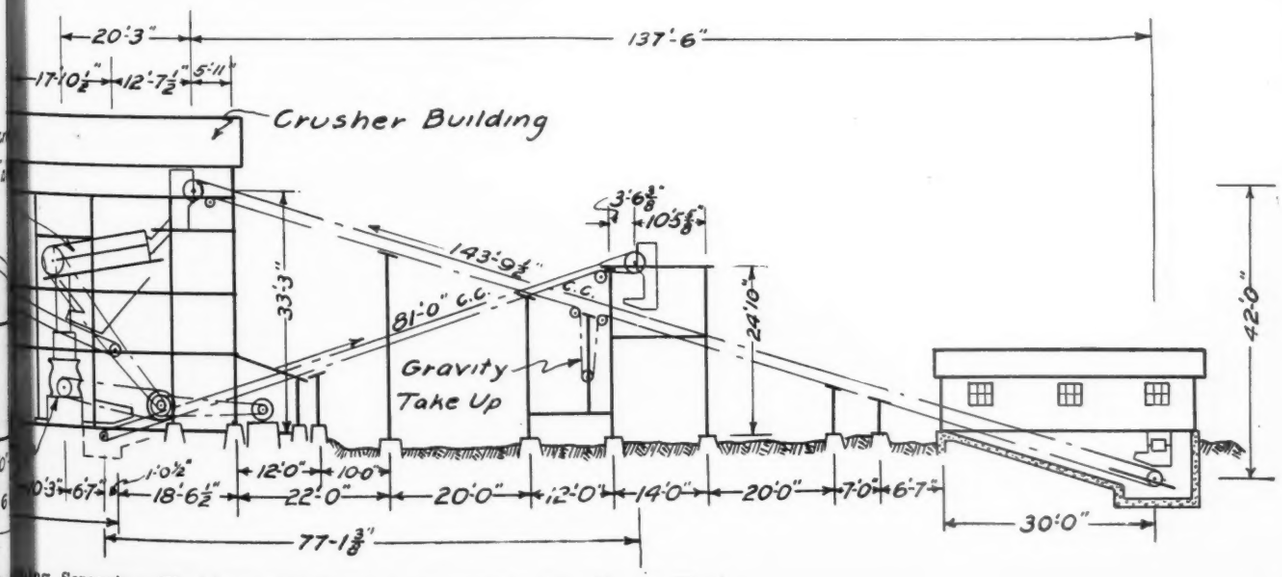


Screens at Koenig Plant

Koenig Coal and Supply Company

The new plant of the Koenig Coal and Supply Company at Oxford, Michigan, is modern in every respect. The present capacity is between 2500 and 3000 tons per day and the design is such that this capacity can easily be doubled when necessary. Speed reducer drives are used for all equipment except the crushers and all units have separate drives. All equipment except that otherwise noted below was furnished by the Link-Belt Company and the plant was designed by C. S. Huntington of that company.

The material is excavated in the pit by a Bucy-



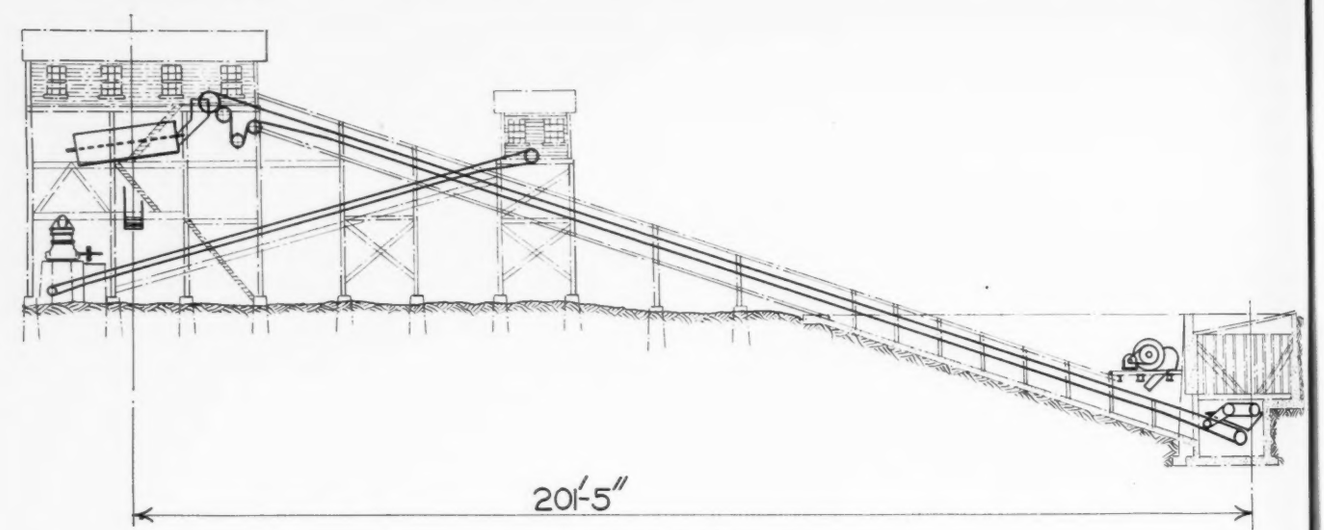
ng, Screening, Washing and Storage Arrangement at the Morton Plant

rus 50B electric shovel and loaded into side dump cars. These are dumped into a concrete track hopper with a rail grizzly, spaced 12 inches, over the opening. A 36 inch flat belt feeder discharges onto a 36 inch inclined belt conveyor on 174 foot centers which conveys the material to the top of the crusher house. The conveyor is driven by a 40 h. p. motor and drives the feeder belt from the tail shaft. An Allis Chalmers Superior 24 by 15 inch jaw crusher alongside the hopper crushes any oversize at the grizzly and discharges directly onto the same belt conveyor. The crusher is driven by a 40 h. p. motor through a Texrope drive.

The conveyor discharges through a chute into a 60 inch by 16 foot trunnion type scalping screen with 2¼ inch perforations driven by a 20 h. p. motor, the throughs going to a 76 inch inclined belt conveyor on 172 foot centers driven by a 25 h. p. motor to the top of the screening building. The oversize goes to a 6 inch Allis Chalmers Superior fine reduction crusher discharging onto a 24 inch 103 foot centers inclined belt conveyor which returns the material to the primary conveyor. The crusher is driven by a 50 h.p. motor through a Texrope drive and the return conveyor by a 7½ h. p. motor.

In the screening building the material is washed by a 60 inch by 10 foot trunnion type scrubber driven by a 15 h. p. motor which discharges into two sets of Link-Belt Dull type 36 by 72 by 96 inch inclined conical screens driven by 25 h. p. motors. These discharge into three bins for the different sizes of gravel and the sand is fed through a perforated chute to four 72 inch Dull sand settling cones which discharge into two bins for the two sizes of sand.

The bin arrangement is rather unusual, each of the five bins being formed by concrete partition walls which also serve as the building foundation. The bins are open at each end and can be enlarged



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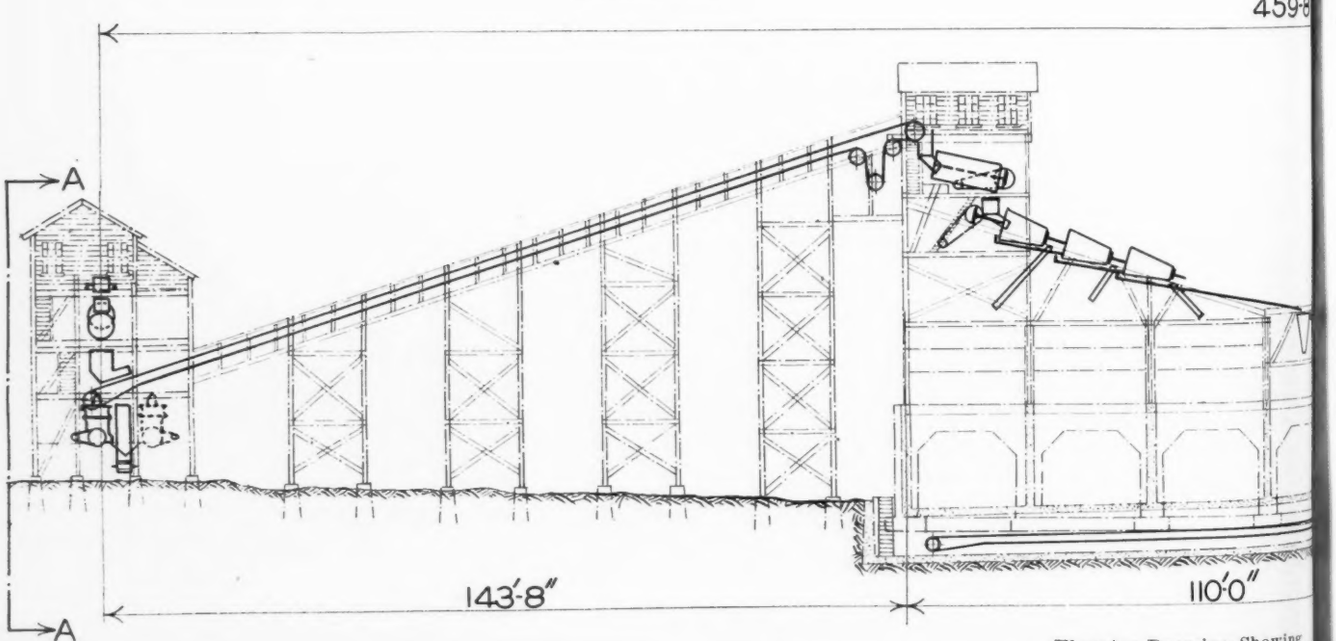
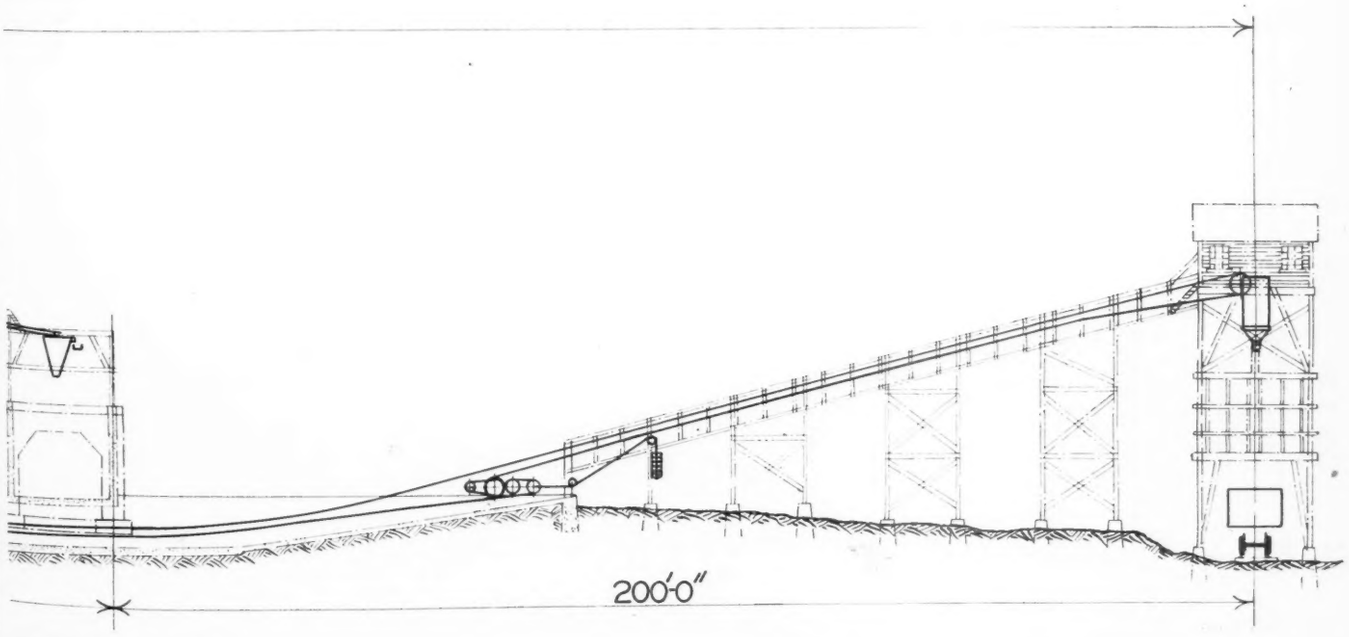


Elevator Drawing Showing

View of Koenig Plant with Conveyor from Hopper in Foreground

at any time by boarding up above the concrete. Segmental gates under these bins, which form their own hoppers, feed onto a 36 inch belt conveyor on 316 foot centers running through a tunnel under the structure. This belt conveyor runs horizontally until out from under the bins and then elevates the material to the loading hopper. This belt conveyor is driven by a 60 h. p. motor and has a capacity of 450 t. p. h. at 300 f. p. m. It discharges into a rinsing apparatus feeding into a bin which discharges directly into cars. This bin is large enough to clear the loading belt conveyor while changing from one size of material to another or while cars are being moved. Washing water is introduced at the end of the second main conveyor and additional washing is done by sprays at the discharge ends of all of the sizing screens.

Allis Chalmers motors are used throughout the plant and all equipment except the two crushers is driven through Link-Belt Sykes herringbone speed reducers, each unit having individual drive. The belt conveyor idlers are all of the anti-friction type and all of the conveyors have screw takeups on the tail-shafts for training the belts. The two main conveyors also have vertical gravity takeups and the loading conveyor a horizontal gravity takeup.



Layout of Koenig Plant

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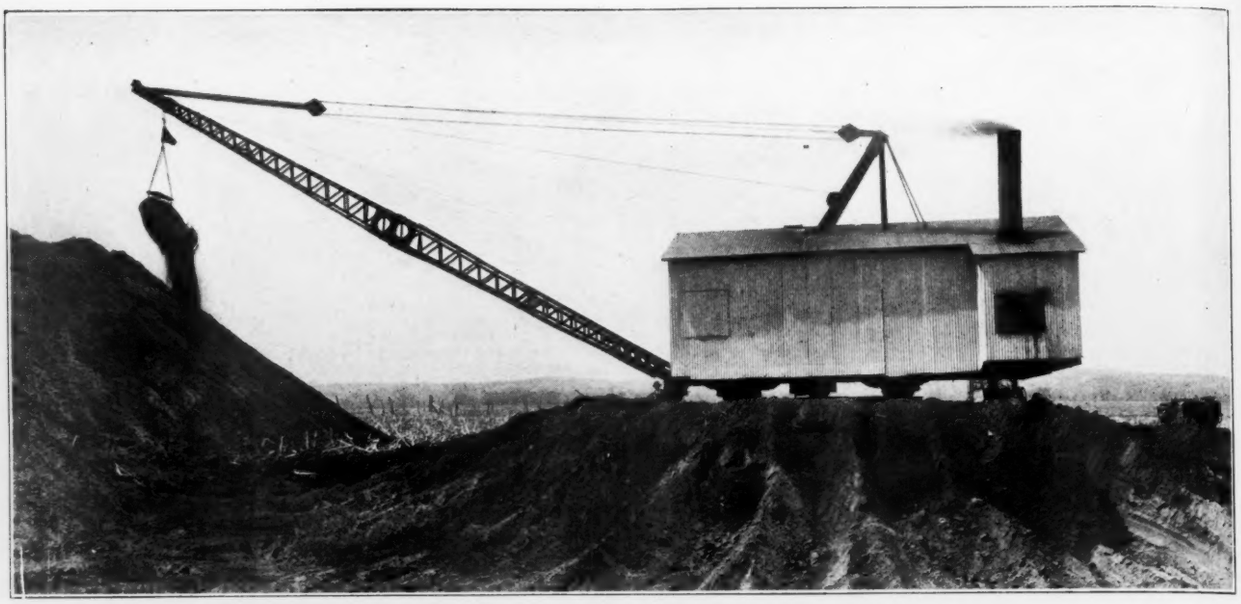


Dragline in Operation at Everist Plant

L. G. Everist, Inc.

The sand and gravel plant of L. G. Everist, Incorporated, at Hawarden, Iowa, is in many respects unusual and interesting. The plant itself is of structural steel throughout, fabricated and erected by the Worden Allen Company. The property consists of 95 acres of tested gravel deposit. The deposit averages about 28 feet in depth, of which ten feet lies below water level. The plant has a capacity of approximately 2500 tons per ten hour day.

The material is excavated and hauled by two separate units. The first of these is a two yard Monighan skid and roller dragline which loads a standard gauge 20 yard Koppel Type CD drop side air dump car. A 50 ton American saddle tank locomotive hauls this car to the plant. The second unit consists of a Bucyrus C-14 two yard skid and roller dragline, which loads three 5 yard Koppel dump cars. These are hauled to the plant on a 36 inch track by a 10 by 10 inch Porter saddle tank locomotive. The standard gauge tracks of the first unit are so arranged that pit run material can be

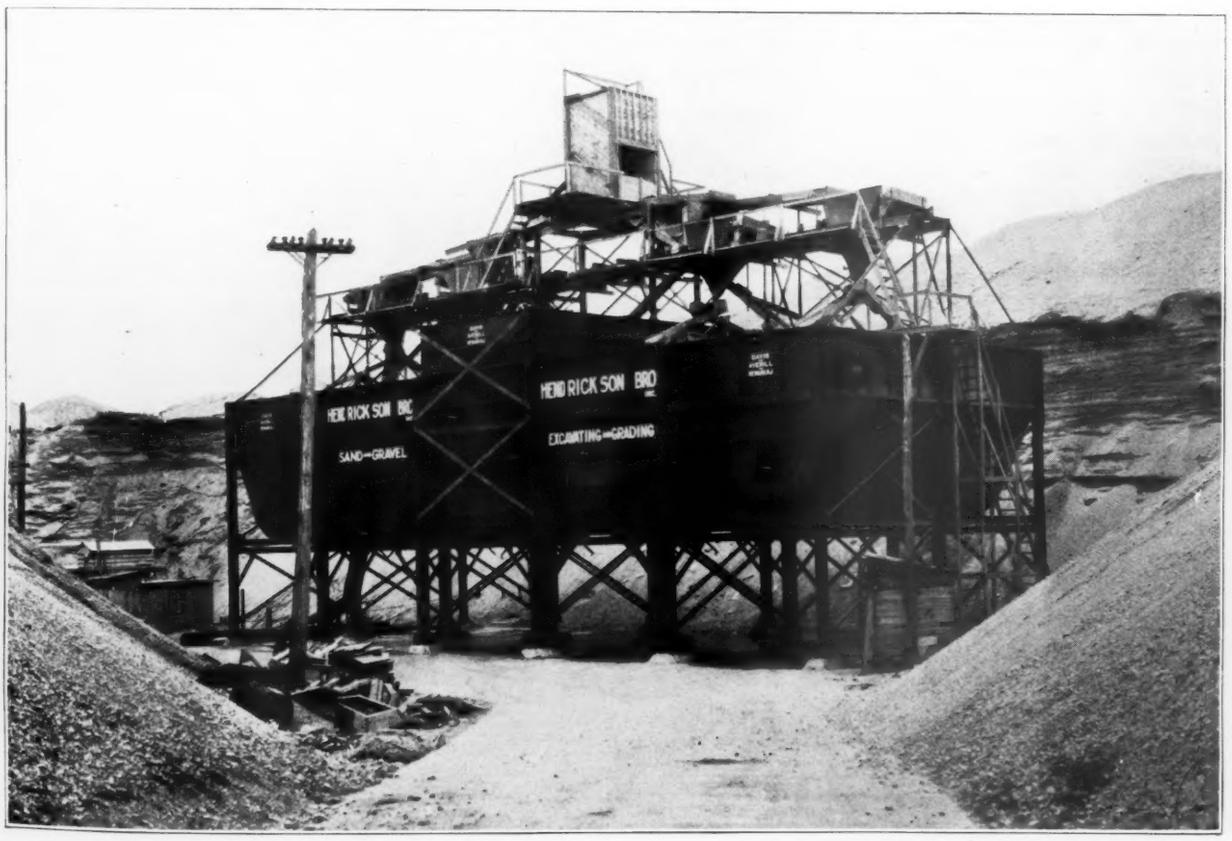
View of Everist Plant Showing Steel Construction

loaded directly into railroad cars for road work.

The cars dump into a 100 ton capacity receiving hopper with a 7 by 7 inch grizzly which is discharged by a 24 inch double pan feeder onto the 24 inch inclined primary conveyor. All conveyors are equipped with Dodge Timken roller carriers and Chain Belt vertical take-ups and Goodyear 6 ply belting is used throughout. This conveyor elevates the material to the screening building where it is discharged into a 5 by 12 foot Allis Chalmers Gates cylindrical screen with 2½ inch mesh manganese wire sections. The oversize goes to a Gates No. 5 Style K crusher which feeds into a 16 inch bucket elevator and back to the scalping screen. The throughs pass to a second 24 inch inclined conveyor and are carried to the top of the washing plant.

This conveyor discharges into a sluice box where an eight inch jet of water begins the washing process. This water is supplied by a single stage centrifugal pump direct connected to a 100 h.p. 440 volt Allis Chalmers motor. The sluice box discharges into a 5 by 18 foot Gates revolving screen. The first 8 foot section of this screen is the scrubbing section and the remainder has 1½ inch perforations. A sand jacket 7 feet in diameter and 13 feet long with 3/16 inch slotted perforations removes the sand. The material passing through this jacket goes to three Telsmith No. 6 sand separators which separate it into two grades of sand. The oversize from the jacket goes to two double deck vibrating screens which separate it into the various commercial sizes.

Dredge at Hendrickson Plant



View of Hendrickson Plant Showing Arrangement of Equipment over Bins

The different sized materials are chuted directly to a tier of six parabolic steel bins with a capacity of 60 tons each. These bins are at such a height that they can discharge from underneath into railroad cars. Each of these bins has two clam shell type gates to speed up the discharge.

Hendrickson Brothers

The sand and gravel washing and distributing plant of Hendrickson Brothers at Mineola, Long Island, is a good example of specialized design to suit conditions. It is a dredging operation with the washing and screening plant installed on top of the bins. The installation was designed and built by Davis and Averill, Incorporated, engineers, of Newark, New Jersey, under the personal supervision of James L. Averill, chief engineer.

The sand and gravel are pumped from the pit by a dredge with Morris pumping equipment, onto an inclined belt conveyor to the top of the plant. Here the material is washed and sized into the required sizes and deposited in the various bins. These discharge directly into trucks for distribution.

There are two parallel rows of five steel bins each, forming two units which have the same sizes and capacities. These can be alternated as desired over any period of time, usually 24 hours, with each series of bins in continuous service throughout the period. This allows for thorough drainage of all material with no interruption in production. The bins are mounted on a structural steel framework of standard shapes with heavy concrete footings. Although the installation is of a permanent type, the bins can easily be dismounted, moved to another site and re-erected. This would require only new concrete footings at the new location.

The total storage capacity of the bins is 1,400 cubic yards and the entire installation is 85 feet long, 35 feet wide, with the top of the lower bins 27 feet 4 inches, and the two central bins 32 feet 4 inches above the ground. These two bins support the settling tanks and screens. Each bin is provided with three duplex gates in the bottom, which are designed to permit the drainage of water from the sand and gravel without loss of material. The output of the plant averages about 400 cubic yards per day, requiring about 5 hours' operation of the dredge. The entire crew consists of three men, one to operate the dredge, one at the washing and screening plant and one to operate the gates loading the trucks.

The Workability of Concrete

The study of the methods for measuring the workability of concrete was pursued during the year and the results presented by the Bureau of Standards before the American Concrete Institute. As an introductory investigation the velocity of a small ball pulled through a cement paste gave interesting results. The apparatus, however, could not be applied to measure the workability of concrete.

The flow table was used with slab top and with a concave conical top, ½ inch, ⅛ inch and 1/16 inch drops being used in each of a series of measurements. A study was made of the distribution of the coarse aggregate after flow, the mass of the concrete being separated by a circular cutter into two equal parts.

A flexible metal cylinder filled with concrete was impacted 30 times by a drop of 1/16 inch on the flow table. The cylinder was then laterally squeezed by applying load at a constant rate. The workability was measured by the load required to produce a certain deformation.

The last apparatus used was a modification of the penetration rod, the first modification being the substitution of a falling weight for the weight of the rod, this weight falling a constant distance at each blow. The number of blows required to produce an 11 inch penetration was the inverse measure of the workability. The apparatus was further modified by the addition of 2 more rods. This latter apparatus is apparently the most sensitive, but it is not believed that it gives all the information needed to indicate true workability.

Properties of Chemical Limes

The preparation of specifications for lime for chemical uses requires a thorough knowledge of the properties of the various limes available for such purposes. An investigation of the properties of commercial chemical quicklimes has therefore been undertaken to develop data which may be used in the preparation of specifications. Thirty-five samples of chemical limes, including both quicklimes and hydrates were obtained for use in this investigation by the Bureau of Standards. The chemical analyses of these limes, including the determination of the less common constituents such as phosphorous, manganese, arsenic, etc., were made.

As the amounts of coarse residue obtained on slaking a quicklime is important in considering the nature and design of processing apparatus, a sieve analysis of the puttys obtained on slaking seventeen of the above mentioned quicklimes was made. The residue on a Number 30 sieve varied from 0.7 to 50.1 per cent, and the amount passing a Number 200 sieve varied from 46.0 to 96.1 per cent. The available lime content of these quicklimes was determined by the modified Scaife method. It was found to vary from 37.9 to 97.1 per cent. No relation could be found between the available lime content and either the fineness or the chemical composition of the lime.

CEMENT TECHNOLOGY IN 1928

By C. H. Sonntag

WE ARE approaching the end of another year of cement making. It will soon go into history, and it seems fitting that we should take a moment to review the changes and advances in the art that have come about in the twelve months just past. In order that things may be viewed in proper perspective it has seemed well to go back a little farther in one or two instances, but in general, what follows pertains to the year that is now passing.

Wet Vs. Dry Process.

This ancient controversy is not yet settled. While most of the plants recently constructed have been wet, one new dry mill was started up some time ago, and another is now projected. A third company has made extensive additions to an old dry plant, and has retained that system.

In the first instance, scarcity of water and remoteness from any large settlement appear to have determined the choice of process. The second plant is to be built by an old established firm whose experience has been entirely with the dry process, while in the third case selection was largely dictated by the mill already existing.

The manufacture of high early strength cement requires, among other things, very fine grinding of the raw materials and accurate control of the mix. It is generally believed that finer grinding with less power can be done in the presence of water, though the writer does not recall any definite proof of this. It is also quite well known that in the past accurate control of the raw mix has been impossible in the majority of dry mills, while it is easily accomplished with the wet process.

Advocates of dry grinding have realized that uniformity can be secured only by carrying a considerable amount of raw mix on hand, and continuously mixing or circulating this at a higher rate than that at which it is being made or used. Of course this was possible by means of standard screw conveyors and elevators, but its necessity became apparent at about the same time that the Fuller-Kinyon pump became available. The simplicity of the latter is making it the preferred means of obtaining the continual circulation and mixing that are imperative for close mix control in the dry process.

Slurry Agitators.

One of the advantages of the wet process is the ability, if operations are properly carried out, of accurate control of the raw mix, particularly with reference to the percentage of calcium carbonate. In most of the older installations the maintenance of a uniform composition has been more or less of an averaging process, the irregularities of the mix coming from the grinding mills being absorbed in a very large volume of slurry whose composition would change slowly. Other plants have a number of tanks fitted with slow-speed agitators, uniformity being secured by mixing the contents of the tanks in various proportions according to their analyses.

In the past year one plant was built having a group of rather narrow and tall tanks fitted with high-speed agitators and mixers. Two additional tanks with agitators were provided, one containing pure limestone slurry and the other pure clay slurry. A very complete piping and pumping system permits the addition of limestone or clay slurry to any of the other tanks, or the mixing of the latter by pumping into empty tanks in any proportion, with subsequent agitation. It was proven that a two-foot layer of pure clay slurry could be thoroughly and completely blended into the contents of a tank in less than twenty minutes. By this system each tank becomes a separate unit of slurry, whose composition may be corrected as often as desired, and which need not be released by the chemist until he is satisfied that its analysis is correct within one- or two-tenths of a per cent, or the limit of error of the analytical method used.

Slurry Filters.

One of the objections to the wet process, and perhaps the principal one, is the increased fuel consumption in the kilns required to drive off the water in the slurry. The mechanical removal of this water has long been an interesting problem, and its possibility was stated in the literature over twenty years ago, so that the process of making cement in this way is not patentable.

Most of the original wet process plants used marl as the source of lime. They were mostly small mills, cheaply constructed, and their supply of marl was limited, so that slurry filtration did not appeal to them, and perhaps was not strongly urged upon them.

The recent erection of a number of large plants working comparatively dry raw materials by the wet process has focussed attention strongly on methods of water removal, and several filter installations are in operation, while more are projected. The first filter was put into a mill using slag as a raw material, with no clay. Slurry made from this mixture is granular, and filters easily. When filters were applied to slurries containing clay it was found that the colloidal properties of

the latter greatly retarded water removal, so that about two and one-half times as much filter surface is required as is needed for slag slurry.

Filtration of ordinary slurries reduces the water content to about eighteen per cent, at which point it is a stiff paste. Nearly all the development along this line has taken place during the past year, and while figures as to the economy of the process are not generally available, it seems that its adoption is justified from the viewpoints of lowered fuel consumption and increased kiln output, so that more filters will probably be installed.

Kilns.

It had seemed until recently that the matter of kiln length had settled down to an acceptance of about two hundred and fifty feet as a standard, though some considerably longer ones are in operation. Of late there has been a rumor that a new plant is to install a kiln much longer than any now in existence. The general argument in favor of the long kiln is of course fuel economy, with capacity per unit as a secondary consideration. There is also the question of total first cost per barrel of production as compared to that of an installation of smaller kilns of the same total output. This first cost should include not only the price paid for the kiln and its accessories, including delivery, but also the cost of erecting these, putting a building over them if necessary, and every other expense of getting them ready for operation. It is probably true that both operating labor and repairs will cost less per barrel of output with a very long kiln than with its equivalent in kilns about two hundred and fifty feet long, provided that the diameter is increased in proportion to the length.

It is hoped that if such a very long kiln is actually put into use, the industry in general will be permitted to learn the results of its operation.

Coolers.

American practice has become almost uniform in the use of rotary coolers, usually, but not always, located under the kilns. It has been realized, however, that the cooler is not doing all that should be expected of it unless the clinker leaving it can be held in the hand. To accomplish this, coolers have been made larger in diameter and longer than heretofore, and one plant started up this year has two of them ten feet in diameter and ninety feet long. These are, at present, the largest in use, but it is understood that coolers one hundred feet long are under construction.

The past two years have seen installations of two types of coolers that are virtually parts of the kiln structure and revolve with it.

The Polysius cooler is for all practical purposes an extension of the kiln shell. The coal pipe projects a considerable length into the kiln, so that combustion takes place quite a distance from the end of the shell. The shell carries an inner cylinder of about the same length as the coal pipe. The clinker passes through the annular space between this cylinder and the kiln shell proper, and is swept over by most of the air required for combustion, which passes into the kiln through this same space.

The Smidth cooler consists of a group of cylinders attached to the outside of the kiln shell at its discharge end, and parallel with it. Inside these cylinders hang many loops of chain to assist in heat transfer. The coal pipe projects some distance into the kiln, and about opposite its end, ports cut in the shell allow the hot clinker to drop into the cylinders through which it gradually works its way, being cooled by the passage over it of the combustion air.

With both the Smidth and Polysius coolers the end of the kiln is closed in such a way as to compel most of the air entering the kiln to pass over the hot clinker.

Compartment Mills.

Most of the cement plants that have been built in the last year or two have selected some form of compartment mill as the principal grinding unit. This is equivalent to doing two-stage grinding in a single machine. Figures are not generally available showing that power consumption either is or is not less with this system than by separate two-stage grinding, but there is an evident advantage in simplicity, both in operation and repairs. The use of herringbone or spiral gears on compartment mills and tube mills have been tried and apparently found not to be worth the cost, and most mills are now built with plain spur gears with cut teeth, of such ratio that the pinion shaft will run at 180 revolutions per minute.

The old proposition of removing the fines from a compartment or tube mill before they have passed entirely through is still with us, and it is understood that one company is experimenting by using an air separator with a compartment mill, taking the feed for the separator from the mill at about one-third of its length from the feed end, and returning the tailings to the mill.

If there is a standard size for compartment mills it may be said to be 8 by 7 by 40 feet, absorbing 800 hp., but larger and longer ones have been built, as well as many smaller ones. The largest to date requires 1500 hp. to drive it, and it seems likely that the standard mill, if there ever is one, will be larger than most of those now in use.

Cooling Compartment Mills.

Some types of dry pulverizers have a sort of fanning action which induces a current of air through the mill, tending to reduce its temperature, carry away any moisture that may be pres-

ent, and keep the screens clean, while at the same time keeping the air around the mills free from dust.

More energy is put into a large compartment mill than into any other grinding unit, and practically all this energy reappears in the form of heat. Temperatures may rise so high that gypsum is dehydrated, bearings are difficult to lubricate, and the cement going to the silos is so hot as to injure cotton bags.

It has been proposed to spray water over the outside of compartment mills, and this would, without question, give efficient cooling, but the general complication involved and the desire to keep water vapor out of the mill room have prevented so far any general adoption of this idea, though it may be necessary when very large units are built.

Within the past year or so it has been found possible to design a dust collector so as to draw enough air through a compartment mill to reduce its temperature thirty degrees or more, and this idea has been adopted in a number of installations.

Open Vs. Closed Circuit Grinding.

The argument between the proponents of these two systems has gone on for some years, and is apparently as far from settlement as ever. It would not be mentioned here were it not for the fact, already touched upon, that one company is said to be experimenting with a modified or partial form of closed circuit grinding by removing the material from a compartment mill after it has gone about one-third of the way through, and passing it into an air separator. The fines are understood to be finished cement, while the tailings go back to the mill, the final discharge of which is also finished cement.

No operating data of this installation are at hand, nor does there seem to be any disinterested information on this subject available. If the claims of the advocates of closed circuit grinding can be substantiated, even in part, the system would seem to be a very real advance in the art, and it is hoped that before long the matter will be tried out on a full-sized operating scale and under strict scientific control.

The above refers particularly to dry grinding. The writer knows of no attempt to grind cement slurry in closed circuit. In such a trial such questions as the different rates of settling of the constituents and the allowable percentage of water would demand careful consideration. Ordinary slurry is so thick that settling of the coarse particles is very slow.

Coal Dryers.

For many years it has been standard practice in the cement industry to dry coal in some form of rotary dryer prior to grinding. When powdered coal as fuel was taken up by central stations, they objected to the rotary dryer and several forms of stationary dryers were developed in which the crushed coal passed slowly by gravity through narrow passages between ducts carrying steam, stack gas or the gases from special furnaces. It should be noted here that a steam boiler has considerable heat storage, and is not as sensitive to the presence of moisture in the fuel as is a rotary kiln.

Certain types of coal grinding mills embody the air separation principle, the air being used in a closed circuit comprising the mill and separator. It has been recently found that if this air, instead of being used over and over, is vented from the system and fresh air is admitted to take its place, this air may be made to carry away most of the moisture in the coal, so that drying and grinding go on together as one process. Of course the air leaving the system carries considerable dust, which must be taken care of by a suitable collector. The principle applies both to high-speed pulverizers and those of the ball mill type.

This method of grinding does away with the coal dryer as a separate unit. It is a very recent development, and it is likely that its limitations are not thoroughly known. In the absence of specific information it seems wise to prevent, if possible, the saturation of the out-door coal pile by rain or snow.

Dust Collectors.

The general improvement in working conditions that is going on in most manufacturing establishments has affected the cement industry also, and serious and successful attempts are being made to collect the dust that once was considered a necessary evil. Efforts along this line began in the packing departments, but two or three years ago one or two far sighted manufacturers tried dust collecting throughout their mills. The results were so thoroughly satisfactorily that a number of old mills were equipped in the same way, and the new plants started up in the past year have all included complete dust collection apparatus as a part of their equipment. Collectors for grinding mills may also serve to draw cooling air through the mills, as has been previously mentioned.

Of particular interest, is the collection of the dust in the gases leaving rotary coal dryers. This has long been considered an insoluble problem, for the gases carry much water vapor and there is the possibility of spontaneous combustion. During the past year it was learned that if the dryer is properly operated the gases leaving it need not be saturated with moisture, nor need they be at a very high temperature. Following this discovery one new mill equipped its coal dryer with a complete dust collector of the bag type. This particular dryer is fired with powdered coal, and the combus-

tion gases as well as the water vapor from the drying coal all pass through the collector. This installation has been running about three months in an entirely satisfactory way, and appears to have solved the most difficult dust question about a cement plant. Other mills will doubtless fit their coal dryers up in the same way.

The feeling persists, and is probably getting stronger, that the dust in kiln stack gases ought to be taken care of. A few Cottrell installations are being made, and at least one of the Sirocco centrifugal type. The high cost of stack dust collection has so far acted as a deterrent, but it will eventually become common, and cement making will become a practically dustless industry.

Waste Heat Vs. Central Station Power.

Very few installations of waste heat boilers have been made in cement mills in the past year, and one was in a dry process mill. There are various reasons for this failure to take advantage of what looks at first like a real economy.

Most of the plants recently built use the wet process, and there is some question whether they could obtain all the required power from waste heat. This is particularly true if the clinker is stored during the winter, and ground up in the summer in excess of its rate of production. In such a case the power consumption is not uniform, being low in winter and high in summer, while waste heat is being evolved at a nearly constant rate.

Then too, public service companies have realized that a cement mill load is a particularly desirable one for them, and have put the price at which they will sell power at a figure just below that at which cement companies would be justified in using their waste heat. This is not true in all parts of the country, and in such cases it is likely that more waste heat boilers will be put in unless the price of central station energy is reduced.

Synchronous Motors.

One of the reasons why cement mill loads are so attractive to central stations is the high power factor resulting from the progressive increase in the use of synchronous motors. They are now applied to air compressors, high-speed pulverizers of the Hercules, Fuller and Raymond types, to crushers of various kinds including hammer mills, and to slow-speed grinders such as ball mills, tube mills and compartment mills, as well as to motor-generator sets. As is well known, the average synchronous motor is at a disadvantage because of its low starting torque. With air compressors and motor-generator sets this is of no particular importance. High-speed pulverizers are best started through magnetic or band clutches after the motors are up to synchronous speed.

Hammer mills offer a starting load of very high inertia, which requires an appreciable interval for bringing up to speed, and any clutch used for this purpose must operate under very trying conditions. The same thing is true to a lesser extent of ball, tube and compartment mills. With the latter machine the power per unit is at the upper limit of the development of magnetic clutches.

The past year has seen the increasing use of a type of synchronous motor that starts as a slip-ring induction machine, with all the desirable starting characteristics of the latter. When practically up to the highest speed it will reach as an induction motor, the passage of direct current through the rotor windings causes it to pull into step and operate as a synchronous motor. The 1500 hp. motor previously mentioned is of this class, and several of 800 and 900 hp. ratings were put into service in 1928.

In the present state of development, each motor of this type must have its individual exciter, and the direct current is of low voltage and high amperage. It is hoped that eventually it will be possible to excite these machines from a common bus and at a standard voltage.

Emergency Power.

A dry process mill can be shut down with no great loss except that of production. In a wet plant, it is essential that the agitators be not stopped for any length of time, and it is well in either case to be able to roll the kilns over occasionally. No central station power supply is absolutely reliable, shut-downs arising from lightning, transformer burnouts, insulator failures, sleet storms and other causes.

One mill completed this year and running on purchased energy transmitted over a sixty mile line has installed a 360 hp. Diesel engine-generator which can be started and supplying power up to its rating in less than a minute. It has already demonstrated its value on a number of occasions, and the provision of this emergency unit has been amply justified.

Paper Bags.

The advent of the multi-wall paper bag, while it did not take place in the year just passing, has considerably altered the relative positions of paper and cloth bags. The multi-wall bag is a thoroughly reliable package, more moisture-proof than cloth, and far superior in every way to the old single-wall paper bag. It is coming into increasing use, and as it cannot be emptied without destroying it, it bids fair to largely do away with the returnable cloth bag, which has always been a source of friction between cement mills and their customers.

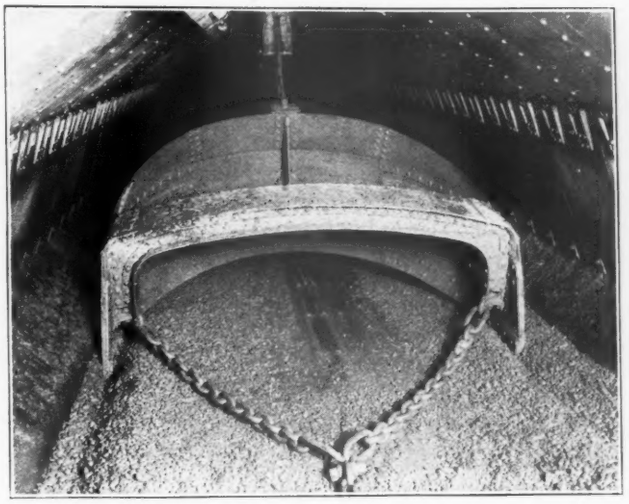
Bulk Shipments.

When cement was first shipped in bulk a few years ago it was felt that this method would in

(*Continued on page* 106)

WATER TRANSPORTATION OF BULK MATERIALS INCREASES DURING YEAR 1928

THE use of self-unloading boats increased greatly during the past year and there were a number of new boats put into service. Although no radical changes in design were brought out, many improvements were made which simplified the operation and increased the rate of discharge of these boats. The Leathem D. Smith Dock Company, of Sturgeon Bay, Wisconsin, installed self-unloading equipment in three boats which are being used to transport materials in the Pit and Quarry field. These were in order of their completion the J. E. Savage, the Sinaloa and the E. M. Young. Another boat, the Material Service, which is now under construction at Sturgeon Bay and will go into operation next spring, has several features not found in the other boats. The Webster Manufacturing Company, of Chicago, converted the Fitzgerald, which went into operation during the last summer.



Close-Up of a Scraper in One of the Tunnels of a Leathem D. Smith Boat

The New Leathem D. Smith Boats

The J. E. Savage and the Sinaloa are of standard Leathem D. Smith design, the unloading arrangement consisting of two longitudinal tunnels built into the bottom of the regular hold with a Sauerman Crescent scraper operating forward and backward in each tunnel. The tops of these tunnels with the sides of the hold make self-cleaning hoppers. The scrapers feed an inclined belt conveyor in the front of the boat which discharges onto a boom belt conveyor on deck. This conveyor boom can be raised or lowered and swung out over either side of the boat for discharge. Stephens-Adamson conveyors are used. The J. E. Savage has a capacity of 6,600 tons, length of 410 feet, beam 48 feet and depth of 28 feet. The Sinaloa has 6,800 tons capacity, length of 416 feet, beam 50 feet, and depth 28 feet. The Savage has actually unloaded at the rate of 1,300 and the Sinaloa 1,250 tons per hour.

The E. M. Young, which is probably the largest boat ever converted into a self-unloader, has a

The E. M. Young Unloading

capacity of 9,500 tons, length of 504 feet, beam 54 feet, and depth of 30 feet. The design and equipment are identical with the Savage and Sinaloa except that the two longitudinal tunnels are divided, due to the length of the boat. Each tunnel has two Sauerman scrapers operating toward the center of the boat where they discharge onto an inclined conveyor. The work was done at the Lorain, Ohio, plant of the American Shipbuilding Company. These boats were all fully described in the August 15 issue of Pit and Quarry.

The Webster Designed Boat Fitzgerald

The Webster Manufacturing Company of Chicago during the last year designed and completed the installation of self-unloading equipment in the boat Fitzgerald, owned by D. Sullivan and Company of Chicago. This boat was completely described in the November 21st issue of Pit and Quarry shortly after going into operation.

The Fitzgerald is 440 feet long overall with a beam of 52 feet and a storage hold 287.5 feet long. It has a capacity of 8,000 tons, which has been unchanged by its conversion, and unloads sand at the rate of 800 tons per hour. Trips have been made during the late summer and fall between a number of Great Lakes ports, handling mostly wet sand and coal, although crushed stone will also be handled in the future.

The original hold was unchanged, except that several of the hatches were eliminated. This of course gives the boat a very low center of gravity. Two Sauerman four yard Crescent scrapers, driven by 125 h.p. Clyde Iron Works steam hoists, feed the material from both ends to three sets of feeders which discharge onto an endless bucket conveyor at the center of the hold. This conveyor elevates the material to a 42 inch feeder belt conveyor on deck which in turn discharges onto the boom belt conveyor.

This conveyor is also 42 inches wide and operates on 140 foot centers. A structural steel A-frame with back legs supports the swinging steel truss boom by means of a 20 cable block and tackle which also raises and lowers the boom. Horizontal swinging of the boom is accomplished by means of a block and tackle arrangement driven by the second drum of the same hoist that controls the vertical motion.

The Leathem D. Smith Designed Material Service Now Under Construction

The other self-unloading boat which is now under construction but will not be completed until

Closeup Showing Unloading Machinery and Boom Arrangement on the Fitzgerald

Two Smith Self Unloaders Just Before Completion

early next year, is the Material Service, which was described in the December 5th issue of Pit and Quarry. This boat is being built by the Leathem D. Smith Dock Company for the Material Service Corporation of Chicago and will transport sand and gravel by way of the Chicago Drainage Canal from the Paul Ales plant at Lockport, Illinois, to docks in Chicago. The principal feature of this boat is the A-frame arrangement for supporting the unloading boom. This is collapsible so that when the boom is fastened down the boat has a clearance of 15 feet 6 inches, and can navigate the Chicago River and the Drainage Canal without necessitating the raising of bridges.

The Material Service is 246 feet long, with a 40 foot beam, and will carry 2,500 tons on a 12 foot draft. The general design is similar to the other boats of Leathem D. Smith design. There is, however, a sand dredging unit which will enable the boat to be used for dredging sand out of Lake Michigan during slack periods. This unit has been designed to occupy the least possible amount of space. The main unloading conveyor receives the sand from the pump and is equipped with a collapsible tripper which will discharge into any batch desired.

The Sierra Under Construction

The boat Sierra, owned by G. A. Tomlinson, of Cleveland, Ohio, is now being converted and will be completed by April 15, 1929. This will be the fourteenth boat to be equipped with the Leathem

The Self Unloader Sinaloa Discharging in Chicago

D. Smith unloading equipment and is the third in two years for the same company, the other two being the E. M. Young and the Sinaloa. It is also the largest boat ever converted at the Sturgeon Bay Docks.

The Sierra is 438 feet long with a 52-foot beam and a depth of 28 feet. The capacity when completed will be 8,000 tons of stone and 7,200 of coal. The design is very similar to that of the J. E. Savage and Sinaloa. Two 10-yard Sauerman Crescent scrapers driven by Sauerman hoists operate in two tunnels discharging at their forward ends to a 60-inch inclined conveyor which feeds the 54-inch boom conveyor on a 150-foot boom. The engines driving the hoists and conveyors are made by the Clyde Iron Works. Two new boilers are being installed which will allow full boiler pressure of 210 pounds to be used for the unloading machinery, resulting in greater fuel economy.

Fifteenth Smith Boat Planned

Arrangements have also been completed for another boat which is to be built in England and equipped there with unloading apparatus of Leathem D. Smith design. This boat is designed to handle bulk cement and gypsum rock and is being built for the Canada Cement Company. Cement will be carried from Montreal to Quebec, Halifax and St. Johns, and gypsum from Nova Scotia to Montreal.

The boat will be full Welland canal size, 260 feet long with a 43-foot beam and a depth of 26 feet. It is designed for sea-going service with the pilot house set back to the A-frame and will have a capacity of 3,000 tons on deep draft and 2,100 tons in the Welland Canal. Two longitudinal tunnels will be used, each equipped with a Sauerman 6-yard Crescent scraper. To keep the cement from shifting while loading the sides of the scraper ramps will be closed up to the deck dividing the hold into three longitudinal compartments.

Concrete Aggregates and Their Durability

For economical concrete construction, it is usually necessary to use the sands and coarse aggregates in the sizes and gradings as found or produced, the cost of extensive screening operations to regrade the aggregates being too great to warrant the use of that method of forming the desired gradation for a particular use. It is known in a general way, that workable concrete mixtures can be made with aggregates of widely different types and gradings. It is possible also to proportion the ingredients so that a concrete of satisfactory strength may be obtained. No rules have been devised, however, for proportioning the ingredients to secure workable mixtures and, at the same time, concretes of the desired strength at the least cost. An investigation has been made by the Bureau of Standards to determine the effects of the sizes, gradations and proportions of gravel, crushed stone and slag aggregates on the strength and economy of concretes. Although the investigation included tests with 232 different combinations of cements and aggregates, this is only a small proportion of the possible combinations and it will be necessary to make further studies before many of the questions involved can be satisfactorily answered.

The durability of concrete aggregates when subjected to weathering is an important question confronting the users of concrete, the disintegration of rock being geologically attributed in large part to alternate cycles of freezing and thawing. The freezing and thawing of test specimens to determine their resistance to this process is a procedure of such length that accelerated tests are desirable, three such tests having been proposed, the sodium sulphate, the sodium chloride, and the boiling and drying cycle. Thirty-six varieties of the most common representative coarse aggregates throughout the United States have been collected by the Bureau of Standards. These include three granites, four trap rocks, four sandstones, seven limestones, six slags and twelve gravels, the latter containing limestone, sandstone, granite, quartz, glacial gravel and slatey schist. The aggregate before testing was all screened to pass a 1 inch mesh and to be retained on a ¼ inch mesh and the grading of the samples was determined both before and after the durability tests. The aggregates were analyzed to determine the stratification, texture, and mineral content, and the apparent specific gravity, porosity and cold water absorption were also determined. Samples weighing forty pounds were each subjected to the sodium sulphate, sodium chloride, boiling and drying, and freezing and thawing tests for 150 cycles. After this treatment all samples were again sieved on a ¼ inch mesh screen to eliminate all of the smaller disintegrated particles and the aggregate made up into a 1:2½:3½ concrete and formed into 6 inch cubes. These cubes were placed in damp storage for three months and tested. All specimens have been made up but the compression tests are not completed.

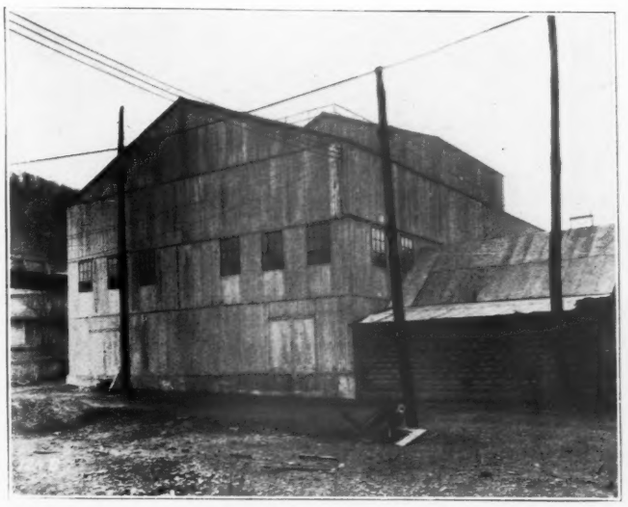
Of the types of aggregate used in this test the limestones apparently show the greatest disintegration. The gravels are composed of such a variety of stone that disintegrated particles are found in most of them but with few exceptions by far the greater number of pieces are sound. Granites and slags have not been affected and only occasional pieces of trap rock have shown signs of breaking up under these tests. From the results there does not appear to be a very definite relation between the various tests, the sodium sulphate and boiling tests, however, apparently being the most severe.

REFLECTING 1928 IN THE LIME INDUSTRY

PENNSYLVANIA claims the honors this year in the lime industry for having within its borders the two outstanding lime plants built during the year and for being the home state of the designers and builders of these new plants. The two new lime plants of particular merit are the plant of Everett-Saxton Company at Everett, Pennsylvania, and the plant of Walter T. Bradley at Swatera, Pennsylvania. The McGann Manufacturing Company of York, Pennsylvania, designed and built both plants.

Both plants have some points of merit in common. Both are substantially built, simple in design and efficient in operation. The Everett-Saxton plant has a hydrate unit, while the Bradley plant does not. The Everett-Saxton plant uses coal for fuel, while the Bradley plant is equipped with a gas producer unit.

The plant of the Everett-Saxton Company at Everett, Pennsylvania, was designed and built by the McGann Manufacturing Company. The most striking feature of this plant is its compactness.



Everett-Saxton Company, End of Main Building

The kilns and hydrate plant are in one building. In fact, the complete plant is under one roof. Another feature of the plant is the small amount of power involved. The entire plant has only 57½

Interior of 60 by 80 by 30 Building, Everett-Saxton Company

View of Walter T. Bradley Lime Plant

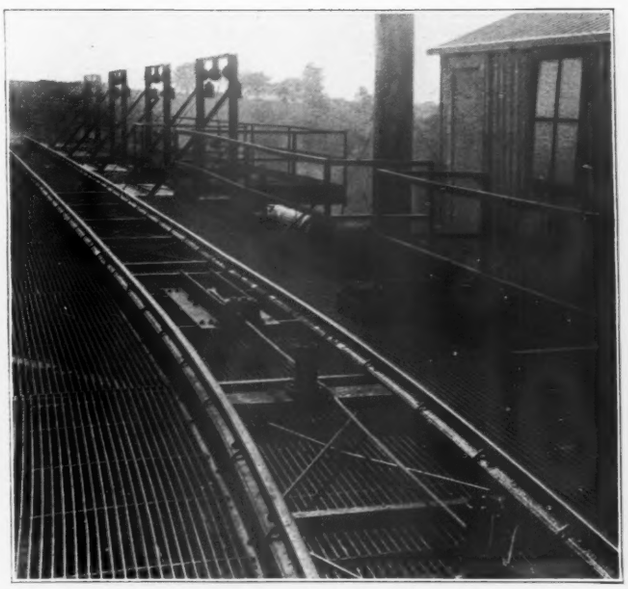
Quarry of Walter T. Bradley with Incline to Plant

h.p. in electric motors with the hydrate plant carrying 40 connected h.p., but requiring only about 26 running h.p. Electric remote controls permits starting and stopping of all machines from a central location with a view of all the moving machinery. Another feature of this plant is the neat fireproof building supplied by the Maryland Metal Building Corporation. Still another feature of the plant, which is quickly noticed, is the absence of dust.

The Everett-Saxton plant was designed to produce 30 tons of lump lime and 75 tons of hydrated lime per 24 hour day. The plant has actually produced as much as 36 tons of lump lime and 90 tons of hydrated lime per 24 hour day. A high calcium stone is at the quarry two miles west of Everett. There are 25 different strata in this quarry and the stone varies in analysis from 64 to 93 per cent in calcium carbonate and from 3 to 28 per cent in magnesium carbonate.

View Showing Incline to Kilns at Walter T. Bradley Plant

The stone is hauled to the plant in Easton quarry cars by a Vulcan gasoline locomotive to the bottom of the incline leading to the top of the kilns. The cars are hauled up the incline by cable and dumped into any one of three York vertical shaft kilns, 11 feet in diameter and 50 feet in height. Hand firing and natural draft are used. Coal is stored in a 60 ton steel storage bin with the bottom discharge gate set at such a height as to load the same quarry cars used in hauling stone to the kilns. The coal is hauled to the top of the kilns and dumped into chutes at the top of the kilns which deliver the coal to the front of the furnace. The lime drawn is delivered by elevator to a storage bin. Provision has been made in this storage bin to deliver lump lime for direct shipment by truck and rail or the lump lime can be taken by a McGann spiral automatic feeder and delivered to the number 4c Schulthess hydrator. The hydrator discharges to an elevator which delivers to two separators. One of these separators is for the superfine hydrate and the other for chemical or mason's hydrate. The plant is so arranged that



Showing the Steel Work on Top of the Kilns at Walter T. Bradley Plant

the rejects or all of the product can go to the hydrator.

Nine men operate the plant during the day. Two 12-hour shifts are used. Mr. George Pilling is president of the Everett-Saxton Company and Banks Hudson is general manager and R. E. Harvill is general superintendent.

The new plant of Walter Bradley at Swatera, Pennsylvania, is located twelve miles from Harrisburg on the Philadelphia and Reading Railroad. This is a gas producer plant. An R. D. Wood gas producer is used. The quarry is adjacent to the plant. The stone is hauled up an incline and dumped into four York kilns 11 feet in diameter

The Only Place in the Bradley Lime Plant That Is Not Automatic

Interior View in Bradley Plant Showing Substantial Construction

and 60 feet in height. This plant was designed to produce 80 tons of lump lime per day and is now doing better than that.

The plant is a substantial, well-built unit with kilns, lime storage and gas producer units all under one roof. The different illustrations that accompany this article show clearly the excellent structural details carried out. The outstanding feature of this plant is the automatic system of operation from start to finish. The only place in the plant that the men handle lime is on the picking table, which is simply an extension of the conveyor draw system from the end of the kiln to the elevator that delivers to lime storage. Provision has been made in the layout for four additional kilns as a 100-ton hydrate plant.

Coal is handled to the gas producer by a Jeffrey conveyor. The lime elevator which delivers from the kilns to storage was supplied by Latimer. A Link Belt portable loader is used in loading from bins to cars or trucks. The building was furnished by the Maryland Metal Building Corporation.

Walter T. Bradley is owner of this plant. Park Cassidy is superintendent in charge of the plant and Ira T. Boger is assistant superintendent.

Benefits of Automotive Standardization

"No industry has been more active or produced more standards than has the automobile industry," declared C. F. Clarkson, general manager of the Society of Automotive Engineers, at the National aeronautic meeting of the Society in Los Angeles recently. "Standardization of the right type is in no sense stagnation; it must always be subordinate to progress and design. Standardization does not impede necessary change," he continued, "but fa-

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(*Continued from page* 98)

time constitute an important factor in cement deliveries. This expectation has not been fully realized, even when cars are unloaded directly by consumers. Apparently the use of the bag as a unit of measure as well as a package, and the necessity for special arrangements for unloading, storing and handling bulk cement have militated against its extended use, though it is understood that much of the cement used on highway work for the state of Iowa is sent out in bulk.

The value of this means of handling cement will eventually be settled on a dollars-and-cents basis. It is to the interest of producres to do away with the use of bags, and especially cloth bags, if possible. It is to the interest of the consumer to receive his cement in bulk if he can save money by so doing when every item of cost, both for and against, is considered. It would seem that some organization could well afford to make an investigation of this subject from the cost viewpoint, for the information of everyone concerned.

Truck Loading.

Mills in the neighborhood of large cities have found that many of their customers prefer to send their trucks to the plant, so that they may take the cement direct to the job. The older packhouses were not so laid out that trucks could be loaded very handily, but in recent designs special bag conveyors and loading platforms are provided so that truck and car loading may go on independently and without interference with each other. This is of considerable aid to the shipping department in times of car shortage.

Boat Transport.

The carrying of large cargoes of bulk cement from water-side mills to storage in distant cities has been practiced on the Lakes for some time, and boats built especially for this service are in use. It seems probable that this system will be extended on the Lakes, and there are rumors that a beginning will be made on the Mississippi River. Special shallow-draft vessels will be designed for the purpose. So far as known, no attempt to carry bulk cement in ocean-going ships has been made.

Summary.

While some advances have been made along many lines of cement manufacture, the most important developments in 1928 have been:

(1) The use of filters on slurry containing clay.
(2) The increase in size of rotary clinker coolers.
(3) The use of individual unit high speed slurry agitators.
(4) The building of very large compartment mills.
(5) The application of dust collectors to coal dryers.

These things and others are definite betterments and improvements in the making of Portland cement, and show that its technology is still enjoying the healthy growth that characterizes a thoroughly live industry.

PROSPECT OF 1929 PLANT EXTENSION

FROM the results of our investigations, it is apparent that the pit and quarry industries intend to carry on a strong campaign to cut costs and improve plant efficiency. A partial picture of these plans may be gathered from the facts appended below. Many of the companies have decided on their 1929 programs, according to the information presented.

New England States

The Fair Haven Marble Company of Fair Haven, Vermont, expects, among other improvements, to install an overhead carrier and increase its production about 10 per cent. American Soapstone Company of Chester Depot, Vermont, will open up a new quarry and will use about 1,600 feet of 16-pound rails. If business progresses, as anticipated, it will add some new grinding machinery and increase the daily tonnage to eliminate the necessity of operating the plant at night. The Vermont Snath Company, Springfield, Vermont, is expecting to furnish sand for a three-mile road to be built during the summer, in which case it will make the necessary improvements, as its production is pretty well absorbed by iron and brass foundries. The Pownal Sand and Gravel Company of Pownal, Vermont, has just installed a steam shovel and is contemplating the purchase of some 4-inch pipe and a settling tank. A storage plant 20 by 40 by 20 feet is to be built, for which a sand screen and possibly a gravity washer and settling tank will be needed. These additions are intended to reduce the cost of handling and increase the speed of loading rather than to increase production.

The Dwyer Machine Company of East Lynn, Massachusetts, will build a 500-ton capacity sand and gravel plant. The Nelson Cement Stone Company, Quincy, Massachusetts, will make such rearrangements that will increase the capacity of the plant, and possibly add a derrick to facilitate handling the production. The Hoosac Valley Lime Company, Adams, Massachusetts, expects to make such revisions that will double the capacity, and line one of the rotary kilns.

Concrete Products of Norwalk, Connecticut, is planning to install a larger crusher and bin and use the present crusher and bin to handle the tailings from the new plant. It is at present crushing 50 to 80 yards per day, but with the added bin and crusher the output can be increased to 150 to 200 yards. The York Hill Trap Rock Quarry Company will install new bins for the quarries. American Mineral Products Company of Hartford, Connecticut, will erect a feldspar grinding mill at Cold River, New Hampshire, for which the construction work has begun. The plant will have a capacity of 200 tons per day. E. C. Sanford Sand and Gravel Company of Bethel, Connecticut, will erect a 100-yard per day capacity plant and expects to increase the production of the present plant by 50 yards per day by installing electrical machinery.

New York

Dolomite Products Company, Rochester, expects to increase its production 1,000 tons per day by installing additional screens. Comfort Coal and Lumber Company of Spring Valley proposes to build a sand and gravel plant of 300 to 400 tons capacity. Considerable new equipment is to be added to the producing plant with a view to increasing the capacity by about 100 to 200 tons per day. T. Mincer of Harlem River contemplates the installation of two mixers for a ready mixed concrete plant and the addition of two trucks. L. H. Ludwig of Jamestown is also planning to install a concrete mixing plant. G. N. Dulin of Jamestown plans to build a 450-ton plant that will require cable excavator, bins, crushers and washing equipment. He has just completed new washing and screening plant of 400 tons capacity. Maclison Sand and Gravel Corporation of Hamilton has started work on a new sand and gravel plant for which a dragline will be purchased as well as the necessary screens, conveyors, washers and other equipment. The Onondaga Brick and Tile Company of Syracuse has rebuilt the plant that was destroyed by fire. The Mayfield Stone Corporation of Mayfield will build a plant with a daily capacity of 500 yards per day. The plans for improving the producing plant are not defined, but they will be intended to increase the present production by about 350 yards. The Ramloc Stone Company of Albany expects to increase its space and add bucket elevator, block machine and mixers. The present capacity is to be increased 100 per cent. The Kellam and Shaffer Company of Schenectady will make some necessary repairs, install a 20-ton crane and increase the stone cutting by 100 per cent. Albany Crushed Stone Corporation of Albany will increase its capacity 250,000 tons next season by using an additional electric revolving shovel, 4 trucks, with 8-yard side dump bodies, and other necessary equipment. Abbe Engineering Company of Brooklyn is adding new equipment to the refining plant. Baldwin Sand and Gravel Company of Elmira has purchased new screening equipment and may add some new bins and a cone crusher to increase the capacity 50 to 75 per cent. Green Hill Mining Company of Gouverneur has a new feldspar grinding plant under construction for which most of the equipment has been purchased. The production will be about 50 tons per day. New Rochelle Coal and Lumber Company of New Rochelle is building a three-story washing plant

and additions to the mill to give a 15 to 20 per cent increase. Peerless Quarries of Utica is increasing its storage bin capacity. Dolomite Products Company of Rochester has plans under way to increase its production by about 100,000 tons next season. F. P. Erkenbeck of Fayetteville expects to install a bin to salvage the fines now passing down the spillway.

New Jersey

Livingston Sand and Gravel Company of Livingston is contemplating the building of a 600-yard capacity operation and erect an asphalt plant. Among the equipment installed will be a complete pumping plant, pipe, barge, crane, shovel and screens. Samuel Braen's Sons of Paterson will add new crushers and make such rearrangements that will increase the capacity by about 150 tons. The Raritan River Sand Company of New Brunswick is installing two 10-inch dredge pumps and additional screening equipment for a 100 per cent increase in production. Sequine-Bogart Company of Kenvil will make the necessary adjustments to produce a better quality product rather than to increase capacity.

Pennsylvania

Land Improvement and Supply Company, of Pittsburgh, will possibly use some new conveyors with a view to reducing costs. West Branch Lime Company of Williamsport will make some improvements and extensions, looking to a 10 per cent increase in production. Shenango River Sand Company of Jamestown is to install a new wash box and 8-inch sand pump to pump from wash box to screens and increase the capacity 75 per cent. Mont Alto Sand Company of Waynesboro contemplates the erection of a new plant, which will include grinding and pulverizing machinery for fireclay, and crushing, screening and storage equipment for the sand, looking to a substantial increase in production and an improvement in quality. New Castle Lime and Stone Company of New Castle will install a gyratory primary crusher to increase the capacity about 1,000 tons per day. The Donaghmore Coal and Stone Company of Lebanon will replace its secondary crusher at the Limestone plant and add a new primary crusher to increase the production 20 per cent. The Enterprise Sand Company of Pittsburgh expects to install a mixer and screening plant, for which the mixer has been purchased, and make such additional improvements that will increase the capacity about 25 per cent. The Everett Saxton Company of Everett will electrify its entire plant, remodel the screening system and make such improvements that will give a 10,000-ton increase in capacity. The Erie Sand and Gravel Company of Erie will install a 60-inch by 19-foot rotary screen with a view to increase the capacity. Copley Sand and Gravel Company of Manorville may add an additional plant to its operations, for which plans are not definitely made. Henry K. Smith of Palmyra is contemplating the purchase of a combination crane to reduce stripping costs. The Noxen Sand Company of Luzerne will purchase a crusher to reduce its gravel to sand and add electric motors and centrifugal pump. Production at this plant increased 150 per cent since 1927. The G. W. Focht Stone Company of Reading contemplates changing its operation from steam to central station power and will require the necessary motors and additional equipment. Allegheny River Sand Company of Kittanning expects to add 100 per cent increase to its capacity by using an additional sand dredge, tow boat and some barges. Duquesne Slag Products Company of Pittsburgh will assemble a new plant mostly from used equipment from other plants and will make the usual improvements for better operation. Its increase in production will depend on sales rather than equipment. Parsons Manufacturing Company of Argyl reports that it manufactures slate products and is always building and improving to lower costs and meet increased demands. The Calcite Quarry Corporation of Lebanon is just completing a new 500,000-ton capacity plant to replace a 200,000-ton capacity operation, or a contemplated increase of 300,000 tons annually. West Penn Cement Company of Butler is planning to install dust collectors. The Keystone Sand and Supply Company of Pittsburgh is just completing a truck distribution plant in Pittsburgh which should increase the daily distribution by 2,500 tons and give 25,000 tons storage facilities. The White Rock Quarries Company of Bellefonte has completely remodeled its plant to increase production, refine the product, and will possibly add two locomotives to the transportation equipment. Easton Sand and Gravel Company of Morrisville will improve its product and make five grades instead of three as at present. The additional equipment will consist of a hopper, a 20-inch belt conveyor and a better means of recovering bar sand to double the capacity and meet the anticipated demand.

Delaware

The Interstate Amiesite Company of Wilmington, which operates 12 plants, contemplates the building of two new plants in 1929. These are expected to increase the production by 50,000 tons. The Charles Warner Company of Wilmington will improve equipment and make such replacements that will insure a better quality product as desired.

District of Columbia

The Industrial Concrete Corporation of Washington will change to electrical equipment and make such improvements that will give a 50 per

cent addition to the present output. This firm anticipates a continued peak in building operations and looks forward to an excellent and profitable year of 1929. The Smoot Sand and Gravel Company of Washington will install new unloading and storage equipment on which the size and class have not been decided. The capacity will be increased at least 33 1/3 per cent.

Virginia

The Toms Brook Lime and Stone Company of Toms Brook is putting in a pulverizing unit addition to its present plant and has just completed a commercial crushing plant. The additional changes will require elevators, pulverizers and screens. Old Dominion Sand and Gravel Company of Petersburg is considering the advisability of putting in a new plant for which the plans are not defined. The State Lime Grinding Plant at Staunton will install new bins, elevator screens, new buckets for conveying stone to screens, a capstan car puller and railroad track scales. Watauga Sand Company of Bristol will install a complete crushing unit consisting of a gyratory crusher, elevator, screens and necessary equipment to increase the capacity 50 per cent.

North Carolina

Grove Stone and Sand Company of Asheville will put in new belt and carriers and such other equipment that will give an increase of 50 to 75 per cent capacity.

South Carolina

W. A. Todd of Meyers Mill expects to build a washed gravel plant, for which he has most of the equipment, and bring the output up to 500 tons in a 10-hour day. Saluda Crushed Stone Company of Greenville is rebuilding its plant, which was destroyed by fire, and will need conveyor systems, a cone crusher and vibrating screens.

Ohio

The Moorac Sand Company of Junction City expects to remodel its plant and use a larger engine and install a dewatering plant. Southern Sand Company of Junction City may add a washing outfit and increase the capacity 50 per cent. Central of Georgia Sand Company of Howard contemplates doubling its capacity and will install 200 h.p. Diesel engine, generator set, three transformers, three motors, two pumps and string three miles of wire to increase the capacity from 12 to 24 cars per day. The McNeel Marble Company of Marietta is now enlarging the plant by installing two additional electric cranes and the necessary equipment to increase the capacity 30 per cent.

The Tarbox-McCall Stone Company of Findlay will make only minor changes in the plant, such as adding shaker screens and rebuilding line. Schumacher Stone Company of Pandora will remodel the bin, install a reduction crusher, and increase the capacity by about 200 tons per day. The Welston Iron Furnace Company of Jackson will increase the cement production 20 per cent by adding one new kiln. Ohio Hydrate and Supply Company of Woodville will probably add some cars, a standard gage locomotive in the quarry and a locomotive crane to give a 25 per cent increase in capacity. The Rubber City Sand and Gravel Company of Akron expects to build a new plant for replacing the old one and increase the capacity 25 per cent. The Wagner Quarries Company of Sandusky will install additional screens, washers, switching locomotive, quarry locomotive and cars. The Olentangy Stone Company of Delaware will increase its storage bins to 1,000 tons capacity, and use additional elevator and screens. George B. Towner of Bradley Lake will install vibrating screens with the expectation of materially increasing the capacity. The John W. Karch Stone Company of Celina expects to erect a 100-ton capacity plant at Montpelier, Indiana. A larger shovel will be installed at the Plymouth Rock crushing plant at Bryant, Indiana. These improvements will increase production about 1,000 tons per day. Horne Avenue Sand and Gravel Company of Akron will install a 400 to 500-yard capacity washer and a dragline excavator. The France Slag Company of Toledo just finished the construction of a new plant and is not contemplating any additions, except as demand warrants. The Limestone Calcium Products Company, Limestone, expects to build a lime and hydrating plant.

Indiana

The Delaware Sand and Gravel Company of Muncie will install vibrating screens and auxiliary equipment to increase the capacity about 10 per cent. Kock Sand and Gravel Company of Evansville will completely electrify its plant and purchase four steel barges. Western Indiana Gravel Company will install a 12-inch dredge boat at Winona Lake and bucket elevators at Terre Haute. Other equipment needed to increase the capacity by 25 per cent are an electric shovel, water pump, crusher and three sand pumps. The Indiana State Farm at Green Castle is to install a crusher and shaker screen. The Logansport Stone and Lime Company of Huntington is installing a stone washer at the Logansport plant. The Connersville Gravel Company of Connersville is erecting a 90-foot mast and will use a larger bucket to increase the capacity 50 per cent. Community Gravel and Sand Company of Bourbon will move its plant to the railroad and will require some additional screens. It is the intention to more than double the capacity.

Illinois

The Colby Gravel Company of Granville expects to increase the crusher capacity to add 25 per cent to the present production. The Ballow White Sand Company of Millington expects a 50 per cent increase in capacity for its special fine graded silica sand by adding a pumping plant and other necessary equipment. The Yourtee-Roberts Sand Company of Chester contemplates the addition of a new steel transfer barge to considerably increase the capacity. Larson and Son of Carlon Cliff will change from a slackline scraper bucket to a slackline cableway and possibly erect a bin for loading into trucks and a small loader. A 50 per cent increase is expected for the necessary additions.

Michigan

The Schubach Gravel Company of Romeo expects to increase its production about 400 per cent by building a new plant which will require screens, crusher, conveyor motor and other necessary equipment. MacNeil Gravel Company of Waterfork expects to add a crusher and a vibrating screen to its equipment. North Star Washed Sand and Gravel Company of North Star will change from steam and gas to electric power and will require the necessary electrical equipment. Ward Sand and Gravel Company will increase the crushing capacity. Wm. Click of Avoca expects to secure a 50 per cent increase by mounting an 8-inch pump on a boat to be operated by a gasoline engine. Nugent Sand Company of Muskegon is planning for a 25 per cent increase by installing new clamshell, screens and conveyors. Crescent Gravel Company of Hersey will need a one-yard bucket and a 24-inch conveyor belt. Sand Lime Products Company of Detroit will double its capacity about March 1st by adding sand screens, brick presses and necessary equipment. Superior Rock Products Company of Randville has not decided to add a new plant to its operations, but will double its capacity by installing two new crushers. Construction materials Company of Grand Haven will remodel its plant, add storing and loading equipment, and double its capacity. Bichler Brothers of Escanaba has just completed a new gravel plant and made some improvements on the quarry and stone crushing equipment.

Wisconsin

The Metro-Nite Company of Milwaukee contemplates the installation of a crushing plant at its Northern Michigan mines. It expects to add such equipment that will double the present capacity. Mayville White Lime Works of Mayville expects to considerably increase its capacity by improving the lime grinding plant and adding elevator, conveyor, motor, grinding mill and magnetic separator. Badger Crushed Granite Company of Lohrville is planning a 10,000 tons increase by installing conveyor and bucket elevator. The F. A. Becker Company of Milwaukee will put in new belting, rollers and motor. Elkhart Sand and Gravel Company of Elkhart Lake expects a 10 per cent increase by installing a locomotive system with dump cars. Moraine Gravel Company of Plymouth built a new plant in 1928 and is not contemplating any additional improvements.

Kentucky

The Cerulean Stone Company of Cerulean contemplates increasing its production from 25 to 50 per cent by installing a shovel. The Poplar Ballast Company of Carter is anticipating a 20 per cent increase by adding a new shovel and some necessary improvements.

Tennessee

The American Limestone Company of Mascot is moving the primary crusher to another location in the plant to increase secondary crushing and a secondary crusher, together with additional drills, will be needed to accomplish the refinements.

Alabama

Superior Clay Corporation of Walker Springs will improve its fuller's earth plant at Alameda and will install screens, crusher and roaster to increase the capacity. Woodstock Slag Corporation of Birmingham has a rebuilding and modernizing program under way at its Vanderbilt plant, where a ready mix concrete plant is being built. All equipment is on the ground, according to report. The Alabama Lime and Stone Corporation of Calera has added a $150,000 pulverizing plant at Calera and has added sufficient equipment to insure an increase of 100 tons per day.

Kansas

The Best Brothers Keene's Cement Company of Medicine Lodge has just completed additions to storage facilities for raw material and finished product. It will probably use some additional air drills and a 50 per cent demand is anticipated. The Putnam Sand Company of Salina is installing an 8-inch pump on a barge being built. It has purchased and is installing the necessary equipment to double the capacity. The Louisville Rock, Sand and Gravel Company of Omaha contemplates an entire new dredging plant, equipped with an 8 or 16-inch pump. This will involve all the necessary auxiliary equipment.

South Dakota

Henry Bering of Hot Springs will use a large derrick, air compressor and saws to get out a first class pink building sand stone.

Missouri

The Kansas City Asphalt Mining Company will build a new plant and increase its production by

about 500 tons per day. The Southern Lime and Stone Company of Carthage is expecting to increase its production of lime and crushed stone by about 100 per cent. It will install a crusher and a glass sand crushing plant. The Illinois Electric Limestone Company of St. Louis is putting in a conveyor system for stock pull, installing rotary dumps, 20-ton gasoline locomotives for quarry, steel dump cars and 2¼-yard electric shovel to increase the capacity 30 cars per day. The Denton Sand and Gravel Company of Pacific has just completed a large plant but will add a tow boat, two barges and a large dredge pump to get a 40-car a day capacity plant.

Iowa

River Products Company of Iowa City is adding new locomotives and cars to do stripping. Ideal Sand and Gravel Company of Mason City is putting in additional screens for the contemplated demand. Yavapai Onyx Mining Corporation is making mine improvements with a view to considerably increasing production. Coon River Sand Company of Des Moines has just completed a plant at Van Meter and is putting in a new screening and crushing unit at the Des Moines plant. It expects 500 tons per day increase in production. Des Moines Valley Stone Company of Bonaparte plans to install a 400-ton crushing plant and use all new equipment.

Minnesota

The Twig Concrete Product and Gravel Company of Duluth plans to erect a 400-yard per day plant. It will be operated by electric motors. F. M. Donnelly expects to increase his production about 40 per cent by adding the necessary equipment and the use of three additional trucks.

Louisiana

The Holloway Gravel Company of Amite expects to install a dredging outfit to increase production about 20 cars per day. The main plant will consist of a 12-inch pump, direct connected to a 500 h.p. motor.

Texas

Hall Brothers of Brownwood expect to at least double the output by installing a power shovel, crusher, belt conveyor and additional auxiliary equipment. Moore and Moore Sand and Gravel Company of Chillicothe will build a new plant this year. Texas Pink Gravel Company of Marble Falls is expecting a 100 per cent increase in capacity and will install cutting and finishing machines. The West Point Company of West Point will install a 15-inch dredge to double its capacity. Beaumont Building Materials Company of Beaumont will increase its capacity 20 per cent and probably use an additional dragline. Southern Gravel Company of Texarkana will double its capacity and install a 500-yard capacity washing plant, together with remodeling and enlarging the present plant. Trinity Portland Cement Company of Dallas will double its present capacity by adding a new kiln, two grinding mills, a cooler and shovel. Panhandle Sand and Gravel Company of Lockney is putting in a sand and gravel washing plant about 35 miles northeast of Lockney. Dinero Sand and Gravel Company of Brownsville is building a 40-car capacity plant to be ready for the building demands. Espey Silica Sand Company of San Antonio contemplates a new 300-ton plant to produce silica building sand.

Utah

Utah Rock Asphalt Corporation of Sunnyside expects to double present capacity by adding large hammer crusher, enlarging the plant and building a three-mile tramway.

Arizona

C. P. Munger Rock Company of Phoenix will open a new pit, use conveyor, purchase large dragline, install secondary crusher and increase production 50 per cent.

Wyoming

Coxeville Phosphate Company of Coxeville will double its capacity by enlarging the plant and installing larger dryer and crusher. Green River Sand Pit of Green River will increase the capacity of the No. 2 pit by the installation of a cableway excavator and crusher.

Montana

The Zonolite Company of Libby expects to quadruple its production by building a large addition to the present plant, the addition of several bucket elevators, worm conveyors, automatic sacking and weighing machines and installing a gravity aerial tramway from the deposit to the Great Northern Railway tracks. The Elliston Lime Company of Helena is planning additional warehouse space for hydrate storage.

Washington

The Lewis County Gravel Company of Centralia expects to increase the production 50 per cent by increasing the digging capacity, install a new belt conveyor and other additions. Queen Anne Sand and Gravel Company of Seattle will double its capacity by installing a new screening system.

California

Frank B. Marks of Newman expects to increase production 25 per cent by building a plant at a new location and using a 1-yard gas shovel, jaw crusher and vibrating screens. The C. B. Hollingsworth Company of San Pedro will put in a washing plant, storage reservoir and install electric motors. Service Brothers of Waterford will build an additional bunker and screen plant to which screens, crushers and conveyors will be added. Kuster and Waterbury of Corona will attempt a 50 per cent

increase in production by putting in a conveyor to the top of the screening plant and installing two crushers and a screen. Flynt Silica and Spar Company of Los Angeles is planning a 35 per cent increase and will install additional air separators and elevators, and complete two fine grinding units for ceramic materials—also the installation of a wet grinding process for non-metallic minerals other than ceramic, dryer and grinding unit with air separation for clays. Kaiser Paving Company of Oakland has plans drawn for a 1,000-ton capacity sand and gravel plant at Livermore, at which point a complete complement of equipment will be installed. P. J. Weisel of Corona expects to double his capacity by installing a 200-ton washing and grinding silica plant and using an additional dryer, screens and possibly a gas electric power plant.

Canada

The Dominion Trap Rock Company of Bruce Mines, Ontario, will install at least one full revolving 3 or 4-yard caterpillar shovel, one 60-ton steam locomotive and dump cars of 12 yards capacity to increase the capacity to 4,000 tons per day. The Beachville White Lime Company of Beachville, Ontario, has purchased a new 15-inch reduction crusher and a shovel on crawlers. The lime plant is being rearranged to increase the daily capacity by 60 tons. Canadian Johns-Manville Company of Asbestos, Quebec, expects to electrify steam shovels and haulage system to reduce costs. Consolidated Sand and Gravel of Toronto, Ontario, expects to install some reduction crushers. Chatham Sand and Gravel Company, W. Chatham, Ontario, has just completed a 30 by 80-foot warehouse and 840 feet of railroad siding. A new shovel and dump trucks will be used to double the present capacity. Nupalyre Mineral and Products of Fort Williams, Ontario, contemplates the erection of a new plant for which the plans are not defined. The present operations will require new crusher and screens to allow a 50 per cent increase in capacity. Gifford Quarry of Gifford, Quebec, will remodel the entire plant and add two crushers, three vibrating screens and a belt and bucket elevator. Montreal Crushed Stone Company of Montreal, Quebec, expects to secure a 30 to 40 per cent increase in production by adding some necessary equipment, including crushers and an improved system of screening. Baron and Frere of St. Hyacinthe, Quebec, will build a new lime plant consisting of two kilns and one hydrator, with the other necessary equipment.

Properties of Gypsum Fibre Concrete

The use of gypsum fiber concrete for poured-in-place floor and roof construction has created a demand for knowledge of the properties of this material. In cooperation with The Gypsum Industries Association the Bureau of Standards has been developing the data necessary for computing the allowable working stress on gypsum concrete. One series of tests was made using cylindrical 6 inch by 12 inch specimens. These were dried in the laboratory air for 28 days. The compressive strengths and elastic moduli of the specimens were then determined. A second series, similar to the first, was made, but the specimens were dried to constant weight in an oven at a temperature of 100°F. The second series in general showed higher strengths than the first. The determination of the modulus of elasticity of these poured specimens was subject to some uncertainty as the surface of the specimens was of different composition from the interior. Consequently a third series of tests was made, in an attempt to remedy this defect. Blocks of the gypsum fiber concrete, 20 inches by 40 inches by 7 inches were cast in a mold. After drying, each of the blocks was cut into three specimens 4 inches by 4 inches by 36 inches. The specimens were dried to constant weight at 100°F. and the transverse strength and moduli of rupture determined. The moduli of rupture varied from 116 to 477 pounds per square inch, depending on the composition of the concrete. After breaking transversely the specimens were cut into blocks 4 inches by 4 inches by 8 inches and compressive strengths of these blocks are to be determined and compared with that of 6 inch by 12 inch cylinders cast at the same time as the slab.

Thirty-seven Standards Adopted

All of the new standards and revisions of existing standards in the automotive field, numbering 37, including 16 aeronautic standards, which were presented as recommendations and approved at the Summer Meeting of the Society of Automotive Engineers at Quebec last June, have now been approved by letter ballot of the voting members of the Society.

Of greatest general interest is the new standard of a limited number of balloon tires and rims. The most important new work is in the adoption of the aeronautic standards, most of which are primarily of engineering interest only but will tend toward a greater degree of interchangeability of parts and reduction of manufacturing cost of airplanes.

Molded Articles

Molded articles suitable as building materials or in the construction of refrigerators comprise asbestos bonded with an inorganic binder, e.g., hydrated calcium silicate, coated with a layer of a synthetic resin made from a polyhydric alcohol and a polybasic acid, e.g., from glycerin and phthalic acid, and preferably mixed with fillers and plasticisers. L. E. Barringer.

TWO TYPICAL 1928 CEMENT PLANTS

THE year 1928 saw the completion of a number of new cement plants and the starting of construction of many others. There were also many plants which completed extensive additions, enlargements or improvements. These plants were of both the wet and dry-process types.

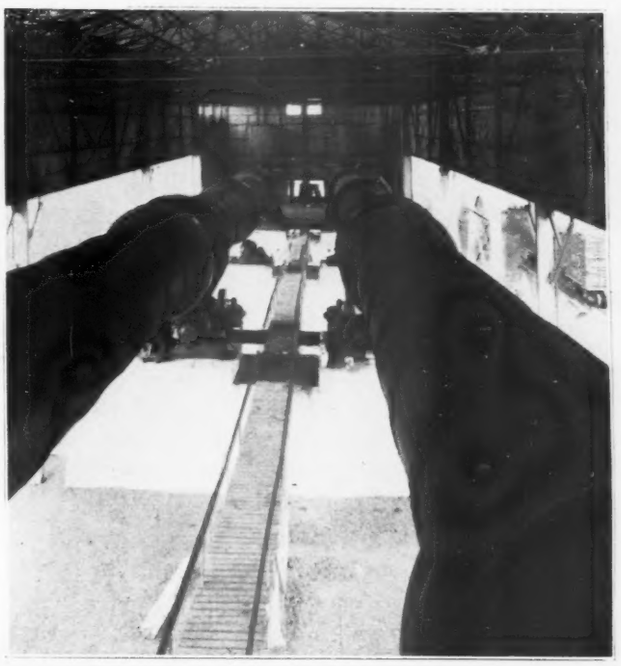
Among the new plants completed was the Volunteer Portland Cement Company plant at Knoxville, Tennessee, a 3000 barrel wet-process unit. The Colorado Portland Cement Company put into operation a 3500 barrel dry-process plant at Boettcher, Colorado. The Keystone Portland Cement Company completed a new 3000 barrel wet-process plant at Bath, Pennsylvania. The new 3000 barrel wet-process plant of the Lawrence Portland Cement Company at Thomaston, Maine, also went into production.

The wet-process plant of the Volunteer Portland Cement Company at Knoxville, Tennessee and the dry-process plant of the Colorado Portland Cement Company at Boettcher, Colorado, are typical of the modern trend in plant design. A brief description of these plants follows.

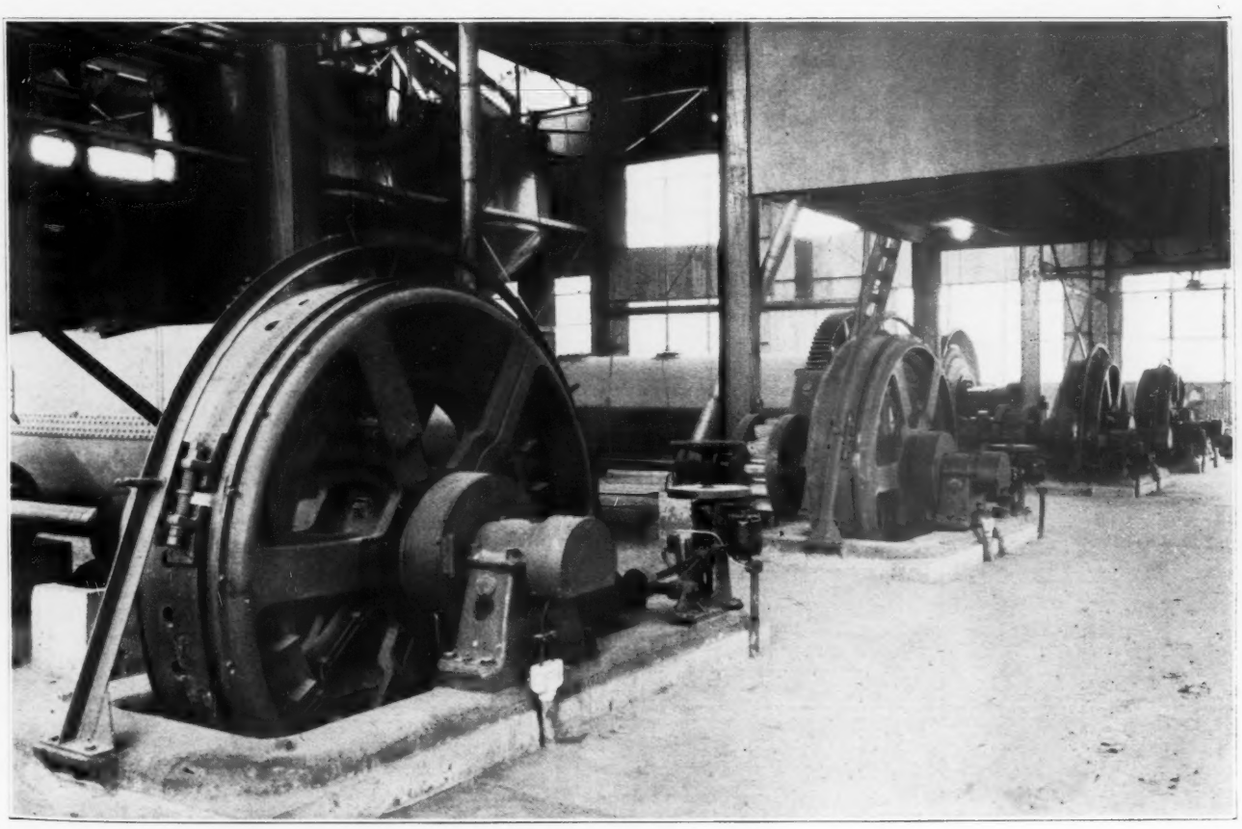
The Volunteer Portland Cement Company

The new wet-process plant of the Volunteer Portland Cement Company near Knoxville, Tennessee, which went into operation early in May, 1928, has a 3,000 barrel daily capacity. The 400 acre property contains limestone, shale, clay, sandstone and marble, a large portion of these being exposed. The plant is about six miles from Knoxville and is served by both the Southern and the Louisville and Nashville railroads.

Much of the construction work was done by the company's own forces. The two 175 foot stacks,



Kilns at Volunteer Plant



Grinding Mills and Drives in Volunteer Plant

Shovel in Quarry of Volunteer Plant

slurry tanks, storage silos, and the packhouse were built by the Burrell Engineering and Construction Company. The steel buildings were furnished by the Virginia Bridge Company and the Ingals Iron Works, and the concrete work for the clinker storage, building and machinery foundations was done by the A. R. McMurray Contracting Company. The substation and mill electrical equipment, including distribution, motors and control, were furnished by the General Electric Company.

All raw material except gypsum is obtained on the property. Coal comes from mines within 40 miles of the plant and is secured at a very low cost. Water is taken from above a dam in a creek only a few hundred feet from the mill. Gypsum is shipped from Saltville, Virginia, about 130 miles away.

Overburden at the quarry is removed by hydraulicking and blast holes are drilled by a well-drill. A Bucyrus-Erie 50B 2 yard electric shovel loads the stone into Easton side-dump cars. A Bucyrus-Erie 20B ¾ yard electric shovel loads the shale into center tip platform cars. The cars are all hauled to the plant by a Whitcomb 25 ton gasoline locomotive.

The stone cars dump into a 36 inch Allis-Chalmers gyratory crusher. The material under five inches goes to an inclined belt conveyor which discharges into a Pennsylvania hammer mill by a reciprocating feeder driven through a DeLaval worm gear reducer. The shale is dumped directly from the cars into the hopper of a 50 inch Pennsylvania hammermill fed by a similar feeder. Both of the mills discharge onto inclined belt conveyors to hoppers or storage.

Any surplus of raw material is piled in an open storage shed where a Milwaukee Electric Crane and Manufacturing Company bridge crane equipped with a clamshell bucket loads the materials into their respective hoppers. Gypsum is unloaded from the cars directly into the shed where it is similarly handled.

The mill building contains two raw and two finish grinding mills, each 7 feet by 39 feet, all of them being furnished by F. L. Smidth and Company. Eight Schaeffer "Poidometers" over American Miag Corporation conveyors feed the rock and shale to the raw grinding mills and the clinker and gypsum to the finish grinding mills. They are arranged so that the chemist can change only the proportion of mix and the miller only the volume of feed. The mill is also equipped with two Northern Blower Company dust collectors.

A service tunnel which runs through the mill building and under the clinker storage contains a

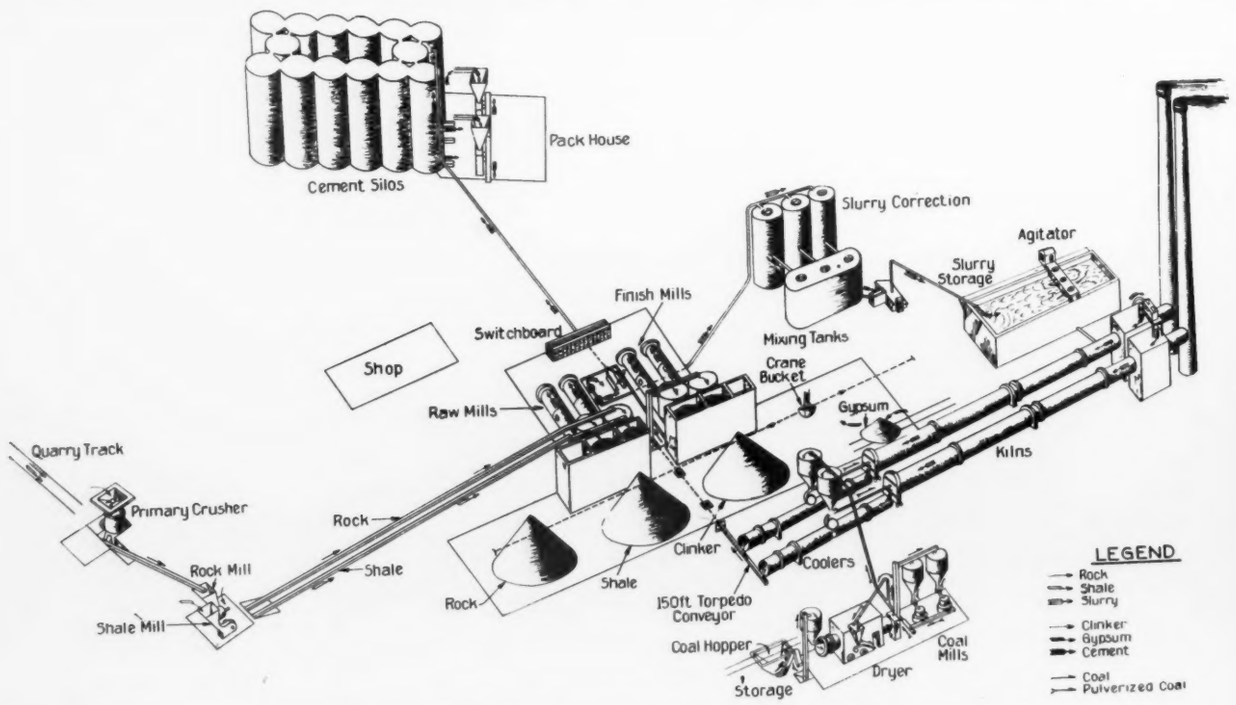


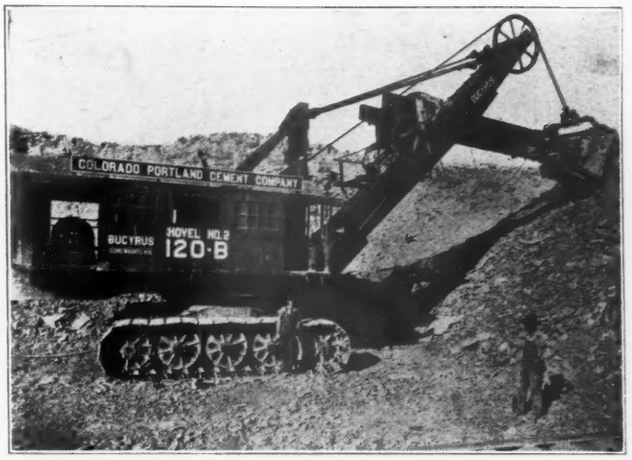
Diagram Showing Flow of Material at Volunteer Plant

clinker conveyor. There are also two Wilfley slurry pumps which discharge into three correction tanks with vertical shaft agitators driven through a De Laval reducer. Two more Wilfley pumps transfer the corrected and mixed slurry to the 7,500 barrel capacity outdoor storage basin. An F. L. Smidth traveling bridge agitator prevents segregation, the mechanical agitators being driven through a Jones reducer.

The two kilns in the kiln house were made by the Vulcan Iron Works and are 10 feet in diameter by 215 feet long. They are driven at the rate of 1 r.p.m. through a Link-Belt chain and four gear reducers. The air and coal blowers were furnished by the American Blower Company and the slurry feeders are of Ferris manufacture.

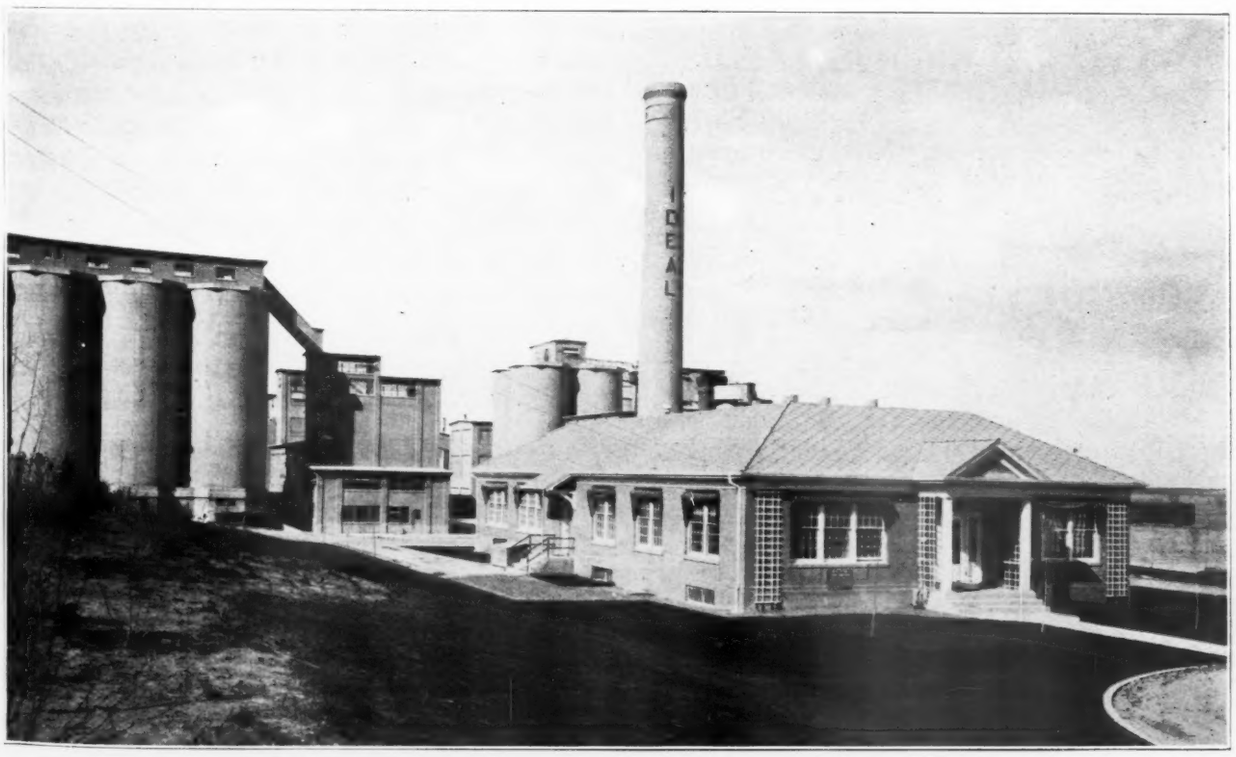
The two coolers were furnished by the Traylor Engineering and Manufacturing Company and are driven through Traylor reducers. These coolers discharge onto an American Miag conveyor 150 feet long, driven through a De Laval reducer, which operates in the service tunnel and feeds a bucket elevator in the mill room. The elevator discharges onto a conveyor which delivers the clinker to hoppers over the finish mills, the excess going into storage.

Two Fuller-Kinyon pumps in the service tunnel deliver the cement to the silos, of which there are 14, having a total capacity of 100,000 barrels. Next to the silos is a 4 story pack-house in which are two Bates bag packers, each of them having a capacity of 10,000 bags per day. There is also a Bates tying machine with a capacity of 3,000 bags per hour. Two Ingersoll-Rand 15 by 12 inch and one 18 by 24 inch air compressors in the grinder room furnish air for the Fuller-Kinyon pumps, slurry agitators and other equipment.

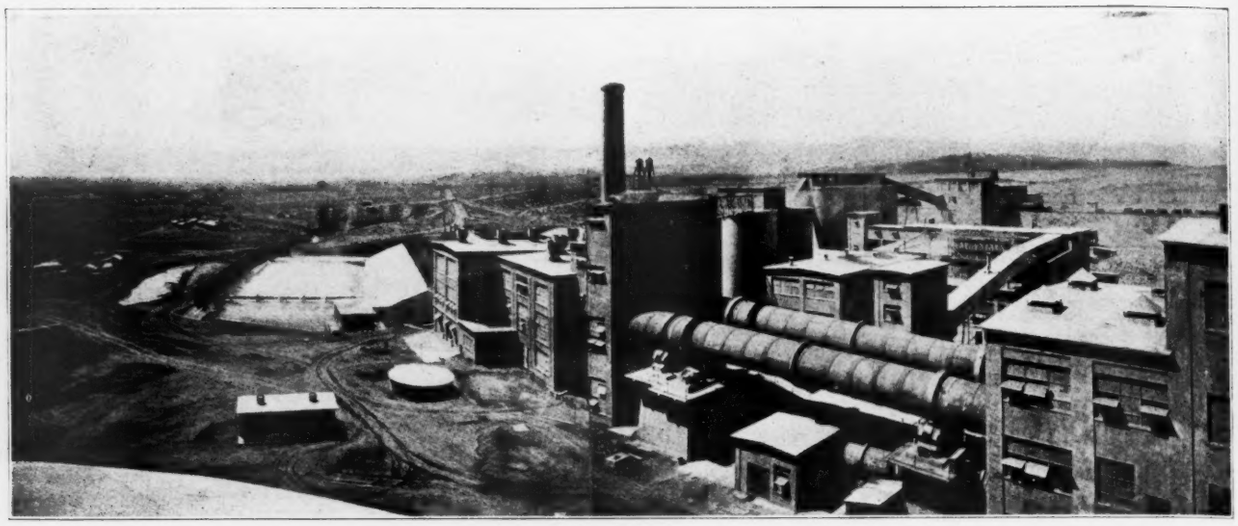


Shovel in Quarry of Colorado Plant

Coal is discharged from cars to a track hopper and is either hauled to storage by a Sauerman Crescent drag scraper or is fed by an inclined conveyor to a Jeffrey single roll crusher. The scraper, which also reclaims the coal, is driven by a double drum hoist. A bucket elevator driven through a De Laval reducer feeds the coal to a Fuller-Lehigh dryer driven through a Jones reducer. A bucket elevator discharges the dry coal onto a conveyor to two Fuller mills which are driven through Falk couplings. A horizontal screw conveyor delivers the pulverized coal to a Fuller-Kinyon pump which discharges to the kiln and dryer furnace hoppers. Most of the coal mill equipment was furnished by the Fuller-Lehigh Company.



View Showing Office and Part of Plant of Colorado Portland Cement Company



General View of Colorado Plant

Power is supplied to the plant from the wires of the Knoxville Power and Light Company at 66,000 volts to a substation on the property. This station has three 1,250 k.v.a. transformers which step the current down to 2300 volts. All motors of 50 h.p. or over use 2300 volts while all of the other alternating current motors use 440 volts. Each department has its own 2300/440 volt transformer. Ten 110 volt transformers throughout the plant step down the 440 volt current for lighting purposes.

J. Ross Hanahan is president of the Volunteer Portland Cement Company and Howell J. Davis is vice-president, E. Earl Evans is secretary and treasurer. Major Frederick H. Lewis is consulting and construction engineer as well as a director of the company, and his son, Major Charles F. Lewis, is manager. F. C. Parsons is sales manager, Walter E. North is engineer, C. A. Moser is mill superintendent, C. L. Branscomb is chemist and E. E. Callaway is chief electrician.

The Colorado Portland Cement Company

The Colorado Portland Cement Company, a subsidiary of the Ideal Cement Company of Denver, Colorado, early in the year put into operation a new dry process plant at Boettcher, Colorado, which has a capacity of 3,500 barrels per day. This is one of nine plants owned and operated by the Ideal Cement Company, three of these using the wet and six the dry process. The plant site is seven miles from Fort Collins and is adjacent to deposits which have been used for the past 25 years to furnish raw materials for the Portland and Concrete, Colorado, plants of the parent company.

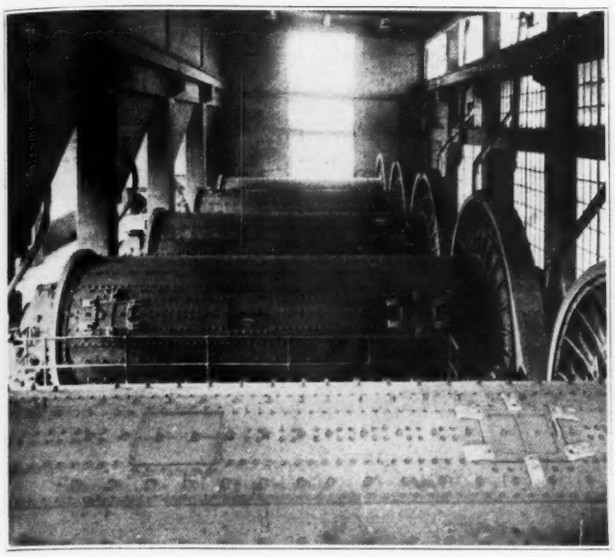
Blast holes at the quarry are drilled by Armstrong well drills. A Bucyrus 120-B electric shovel and a Marion 70 steam shovel load the material into Easton 11-yard all-steel cars, which are hauled to the plant by two steam locomotives.

The cars discharge into an Allis-Chalmers Fairmount 36 by 60-inch roll crusher. An Allis-Chalmers inclined pan conveyor elevates the crushed shale to a storage bin which feeds by a Stephens-Adamson apron feeder to a Williams No. 9 mill. The material is carried from the mill by conveyor to eight storage tanks. On its way to storage it is sampled and weighed by a Merrick "Weightometer." In this way a proper mix can easily be prepared. Schaeffer "Poidometers" draw the shale from storage and deliver to a Bethlehem 14-inch continuous chain drag, which feeds the elevator to the two 7½ by 70-foot Traylor rotary dryers.

The dried material is then elevated to 140-ton capacity concrete tanks which feed into five 8 by 25-foot Traylor cylindrical grinding mills. Three of these mills are for raw material and two for clinker. A screw conveyor feeds the product of the raw mills to a 10-inch Fuller-Kinyon pump, which delivers the material to three 14-foot Sturtevant air separators. If desired, the raw material can be by-passed to the four blending tanks. The rejects from the separators are returned to the raw mill feed tanks by an 8-inch Fuller-Kinyon pump.

Each tank has a 6-inch Fuller-Kinyon pump which conveys the material to the kiln feed tanks. Burning takes place in two 11 by 175-foot Traylor rotary kilns, each of which has a capacity of 2,000 barrels every 24 hours. Gas for firing the kilns comes from the nearby Fort Collins oil field and air is supplied by Sturtevant fans. There is also a complete installation for burning pulverized coal in case of failure of the gas supply. This includes a Raymond coal mill.

The clinker drops into two 7½ by 70-foot Traylor cylindrical coolers into which cold air is blown by a Sturtevant fan. The air leaves the cooler at a temperature of about 450 degrees F. and furnishes the blast for the kilns. The cooled clinker can be delivered either to the finish grinding mills or to stor-



Mill Room at Colorado Plant

age outside of the building. It is conveyed by belt to an automatic clinker scale, where gypsum from a storage bin is added. This conveyor delivers to the two Traylor clinker mills previously mentioned. These mills deliver to an 8-inch Fuller-Kinyon pump, which either sends the cement to storage silos or to the two finish air separators previously mentioned. These separators are capable of turning out material of which 99 per cent will pass through a 200-mesh screen.

There are twelve cement storage silos, each 30 feet in diameter and 80 feet high. Two portable Fuller-Kinyon pumps traveling on rails under the silos allow cement to be drawn from any of the silos by making a simple connection. These deliver the cement to the packing plant in which are four 3 tube Bates packers. Two of these packers deliver to cars on sidings on each side of the pack house.

All motors and electrical equipment throughout the plant are of Westinghouse manufacture. Gear reductions are obtained through Cleveland reducers and all elevators are standard Link-Belt chain type. Sly dust collecting systems are installed in the raw and clinker grinding and crushing plants and the packing and sack cleaning rooms.

Water for the boilers and other uses is pumped to the plant through a 2 mile pipe line from the Poudre River. Condenser water is pumped to a cooling pond where it discharges through Binks spray nozzles. Drinking water comes from two deep wells near the property and is stored in a 30,000 gallon tank.

One of the interesting features of the plant is the utilization of waste heat from the kilns. The waste gases, which have a temperature of from 1400 to 1600 degree F., are drawn through two waste heat boilers. These produce steam at 225 pounds pressure and 150 degrees superheat. This drives a Westinghouse 6250 k.v.a. turbo-generator producing 2300 volt current. A substation connects up with the lines of the Public Service Company of Colorado. A reciprocal agreement is in force so that power can be taken from the lines when necessary and any surplus power can be sold to the power company.

Paul C. Van Zandt, chief engineer of the Colorado Portland Cement Company, designed the plant with J. F. Kaufman as assistant engineer and J. E. Griffith as superintendent of construction. The officers of the company owning and operating the plant are: Charles Boettcher, president; Claude Boettcher, vice-president; R. J. Morse, vice-president and general manager; Harry James, treasurer; Harry Warner, sales manager; I. J. Dilts, superintendent; and W. G. Banks, chief chemist.

Montreal Building Exhibits to Be Held in March, 1929

The Montreal Builders Exchange and the Quebec Retail Lumber Dealers Association will cooperate in holding an exhibition in the Mount Royal Hotel, Montreal, Quebec, March 5 to 9, 1929, according to Assistant Trade Commissioner L. A. France, Montreal. The Montreal Building Exhibition, as it is known, will give architects, builders, contractors, and owners an opportunity to meet and discuss the different aspects of their profession and also to hear prominent speakers discuss prospects in the building trade and advise on technical matters. It is hoped that a higher degree of cooperation between various branches of the building-trades industry will directly result from the holding of this exhibition.

Low Wages—Poor Markets

A revolutionary change has been brought during 1928 into our popular conception of the relationship between wages and costs. There have been, it is true, for years past, a few men who preached that the working man was worthy of his hire. Now, however, the business world as a whole has come definitely to accept the principle that the buying public is identical with the wage-earning public; that poor wages make poor markets; that the most expensive way to reduce cost is to cut the workers' real wages.

We cannot appreciate or foresee what this radical change in business attitude will involve. Its acceptance may prove to go down in history as the outstanding product of the year.

THE WALKING DRAGLINE IN THE PIT AND QUARRY

ADEQUATE machinery for handling the product of the pit or quarry is essential from the time operations begin shaping the deposit for working until the finished product is loaded for transportation.

Among the boom type of draglines the walking machine is interesting because of its peculiar means of locomotion and, consequently, its singular adaptability to certain work.

In most, if not all cases, there is an overburden of top soil which has to be moved. The depth and extent of the overburden is a big factor in determining what disposition shall be made of it. It may be removed entirely from the scene of operations, may be overcast away from the working face or it may be overcast back into the pit or quarry.

Occasionally this top soil is shallow enough to permit removal by teams and scrapers. This, however is a costly method if there is any considerable area to be uncovered.

It is here that the dragline can first be used to advantage. The dragline machine is operated parallel with the line of the proposed face on top of the surface soil, the distance back to the face being governed by the length of the boom to be used. This distance, in general practice, is from one half to two thirds the length of the boom. The length of the boom is determined by the nature of the soil which the machine will handle, the size of the dragline bucket required to meet the conditions most economically with regard to capacity of the machine, and the number of revolutions or swings the machine can make under ordinary operating conditions.

In operation, the machine travels in the direction of the widest area to be stripped or, in other words, it begins at the smaller end, if practical. With the machine placed at the proper operating distance from the proposed face, the width of the swath it will clean out is twice the distance from the face to the centerline of the machine.

The dragline works from the natural ground surface, excavating all of the top soil and drawing it towards the machine itself, leaving the top of the stone ledge or the sand and gravel vein exposed. The excavated material is cast or dropped at the

A Shovel Working Above the Line of Best Operating Level. Working into Face of Deposit, Cleaning Up Ahead of Itself

greatest distance possible from the face. Under ordinary conditions this distance is from sixty to a hundred feet or more, according to the depth of the top soil and the other limiting factors, viz, the size of the machine, length of boom and size of dragline bucket.

Where the operation is such that, after the first cut from the face has been worked to the full length and extreme depth, or to the floor, the overburden can be cast back into the pit. To do this the dragline machine operates as close to the top edge of the bank as is safe and practical, swinging the loaded bucket out over the pit, depositing the load at right angles to the face at a point on the bottom far enough away so that there will be no interference with operation below.

This method of disposing of the overburden requires the use of a longer boom than casting away from the face, to compensate for the lost distance equal to the horizontal distance from the centerline of the machine to the top edge of the bank plus the horizontal distance from the top edge to the toe or bottom of the bank.

Sometimes the question is asked, "What are the relative uses of the dragline and the power shovel?" This can best be described by a horizontal line being drawn to represent the best operating level of either machine. Presuming that the excavation of the deposit to be worked extends above this line, a shovel will be effective because it can operate above this line, cleaning up ahead of it as it works into the face. If, however, the material lies below this line, the dragline is the logical machine to use.

The depth at which a dragline can successfully operate is dependent on the length of the boom used and the angle of inclination of the slope over which the dragline bucket travels from the bottom of the excavation to that point at the bottom of the boom where the drag cable passes through the fairlead, approximately 45 degrees. Thus assuming the dragline is equipped with a 70 foot boom and the material of the bank to be stiff enough to hold up the machine working within 10 feet of the edge, it will be easily possible to excavate to a depth of 35 feet below the surface on which the machine is standing with the boom at an angle of 45 degrees. The reach of the dragline is governed by two factors, first, the length of the boom, and secondly, the angle at which the boom is being operated.

The average dragline machine may be equipped with a boom 50 feet long and is capable of handling a 1 yard or 1¼ yard dragline bucket in what may be termed ordinary material.

All calculations and figures with reference to length of booms and the operating angles are figured from the pivot point of attachment of the boom foot to the main or upper frame of the machine.

Assume that a boom 50 feet long is being used. Working at an angle of 30 degrees, the reach will be 46 feet from the center pin of the machine with a capacity of 4,200 pounds; at an angle of 45 degrees, a reach of 36 feet 6 inches and a capacity of 5,300 pounds; with a boom angle of 60 degrees, the reach would be 28 feet from the center pin with a capacity of 8,400 pounds. These figures are based on 75 per cent of the overturning load in level ground and standard counterweight.

There are different designs and makes of dragline buckets which makes it impossible to estimate with any degree of accuracy the yardage that a machine is capable of handling in a given time.

The digging depth and reach of the dragline bucket may often be increased by the skill and practice of the operator. The bucket can be thrown 10 to 15 feet beyond the point of the boom.

The constant demand for "lower costs" in handling excavated material has developed some machinery of unusual characteristics.

There are numerous conditions met with in earth

Dragline Excavating Below the Line of Operating Level. Working Close to Edge of Pit

moving where the dragline may be used with economy. Its wide range of operation makes possible a large yardage at one setting without loss of time by moving. It can work on the surface, dig below its own level or dig beneath the surface of water.

All dragline machines have many features of construction in common. Primarily, they have that of the rotating or swinging boom and all machines consist of two parts, the lower and the upper frames.

Walking Draglines

While there are not as many makes of the walking dragline, as there are of other boom draglines, their adaptability to sand and gravel pit work under many conditions makes them particularly noteworthy.

The walking dragline is distinctive in its appearance. It is capable of taking a long or short step, and when in an operating position it is noticeable because it rests securely on a base of large area. The area of the base is such that any ground capable of sustaining a man's weight will hold up the machine without any appreciable sinking.

On the walking dragline built by the Monighan Machine Company, the walking shaft, which extends across the revolving platform, is made of High-carbon Hammered-steel forging, with a large upset square shoulder for the walking gear, and the ends are machined square for the operating cams.

The walking platforms vary in width and length, each main platform being constructed of I beams and completely covered with steel plate.

Each walking platform is suspended from its track frame by means of a heavy trunion bearing plate, enabling it to pivot laterally when resting on uneven surfaces.

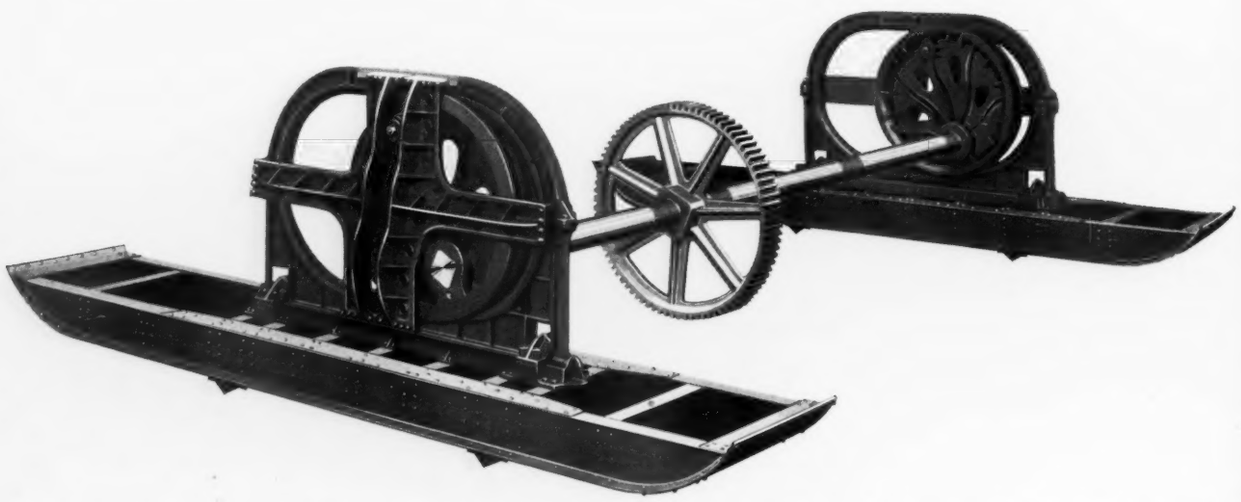
When turning this type of dragline, the boom is merely pointed by means of the swinging machinery in the opposite direction to the desired course of travel, the cams are set in motion and the machine moves in a direct line to its next position.

Platform Is Made from I Beams and Steel Plates. A Heavy Trunnion Bearing Plate of Annealed Runner Steel Is Bolted to the Top of Each Platform. Position of Auxiliary Platform When Walking Over Inclined Surface

In this type of dragline, the ease of traveling and side stepping off of line, makes it perhaps easier to follow the contours of irregular excavations. Due to the fact that the walking platforms are pivoted, the walking device can travel any surface encountered and is able to negotiate very steep grades.

An interesting operation with walking draglines is found in the plant of the Grand Rapids Gravel Company, Grand Rapids, Michigan. One of several machines operating on this property is shown in the accompanying illustration.

This type of dragline is built and equipped with



Complete Assembly of Walking Mechanism. The Walking Shaft Is Made from a High Carbon Hammered Steel Forging. Attached to This Shaft on a Large Square Shoulder Is an Open Hearth Annealed Cast Steel Gear with Teeth Machined from the Solid

Electrically Operated Walking Dragline Owned by the Grand Rapids Gravel Company, Grand Rapids, Michigan. Working Close to Edge of Pit Loading Gravel into Cars

booms from 40 feet to 175 feet long and will handle dragline buckets of capacities from 1 yard to 8 yards. The bearing pressure on the base is approximating six pounds per square inch.

Dragline machines of this type are powered with either Diesel oil engine or electric motor, depending upon the nature of the work and whether or not electric current is available. The swinging device is simple, practical and quick.

Another type of walking dragline is made by Page Engineering Company. The power used on this machine is a Diesel Engine of their own make.

In this machine the walking gear consists of three H-beam spuds, two at the front of the machine and one at the rear, terminating in a large ball and socket joint which is fastened securely to large pads or feet. The pads or feet are of I beam and channel construction, the bottoms covered with steel plate. The H-beam spuds are raised and lowered through heavy manganese steel spud casting securely attached to the upper or rotating frame by means of large gears that operate pinions on a manganese steel rack attached to each spud.

To move, the spuds are dropped to the ground, and the power applied which raises the upper frame and the attached base. The circular base, suspended from I-beam girders under the upper frame, is then run back, the entire machine lowered, the spuds raised and the upper frame or rotating bed is racked back to the proper operating point on the circular base. In this manner this machine can travel in a straight line or "Side step" at right angles.

Clutches and frictions of this machine are air operated. The brakes are manually controlled.

(*Continued from Page* 106)

cilitates the making of needed changes economically. It decreases the original cost and the cost of scrapping special designs, which must of necessity be relatively expensive. The present condition of very satisfactory prosperity in the automobile industry is due in a large part to the action of its far-sighted pioneers, who foresaw the advantages of standardization."

To the adoption of the standardization policy in the automotive industry is largely due the achievement of the American car in its present internationally dominating position. It has been estimated by a large group of engineers that had not the standards been developed, the price of the automobile today would be at least 15 per cent greater than it is. There is every reason to believe that similar advantage can be gained by the aeronautic industry, provided the work of standardization in its field is taken up sufficiently early in a comprehensive way.

HYDRAULICKING AND DREDGING DURING 1928

By George B. Massey

HYDRAULIC stripping of quarry overburden can often be substituted for the older method of using a dragline to strip a narrow margin along the quarry face to allow drilling and blasting to proceed.

With hydraulic equipment installed, this overburden may be moved once for all to barren locations and a large area stripped in advance of actual needs.

The principal cost of hydraulic stripping is electric power for pressure and dredging pumps. The labor for digging, transporting and depositing is less than for other types of work.

Often a hydraulic plant may be operated at night without increasing the demand charge for power. Shifting of pipes can be done in the daytime.

Cold weather and rainy weather do not interfere with hydraulic stripping as much as with other methods of excavation and transportation as the only man necessarily continuously exposed is the nozzle man, and frost does not interfere, as the water draws the frost out of the ground.

There are no tracks to keep up and no wagons to mire down.

There are two methods of using the stream. This is vividly illustrated in the two illustrations of hydraulic tin mining on the Malay Peninsula.

The first illustration shows the stripping operations with nozzles elevated and washing the softer material down the sloping face to the sump.

The second illustration shows the hydraulic mining with nozzles depressed and under-cutting the harder material so as to make it cave and thus expose more surface to the eroding stream.

The third illustration is a close-up of this undercutting operation while stripping a quarry.

The marks indicate where the stream has been played back and forth along the face.

When hydraulic stripping was first used, it was necessary to arrange the work with respect to the differences in elevation and grades, etc., but at the present time this type of work is carried on in almost any locality regardless of the configuration of the ground.

One of the most necessary features in the economic operation of hydraulicking is the size of the pipe used to convey the pressure water from the pressure pumps to the proximity of the face being hydraulicked. A large pipe, of course, costs

Showing Nozzles Elevated

Close-up Showing Action of Nozzles

Showing Nozzles Depressed

more money to purchase and to install but the velocity of the water is so much lower and therefore the friction so much lower that the head created by the pressure pumps is almost entirely available at the working face, whereas with small pipe the pressure pumps discharge under a high head, a part of which is lost by friction in the small pipe before it ever reaches the location where it is to be used.

The size of the pipe, of course, depends upon the distance as the friction is proportional to the length of the pipe. The greater the distance the less should be the loss of head by friction per hundred feet of pipe.

Figure 2

In the case of a large pipe, for instance, where one hundred pounds pressure is required at the nozzle, the pumps might be required to discharge at a pressure of not to exceed 110 pounds, whereas with a small pipe still requiring 100 pounds pressure at the nozzle, the pumps might be required to discharge against a pressure of 150 pounds, which means that during the entire period of operation the horse power is increased about thirty-seven per cent without accomplishing any useful work. In other words, it is a dead loss which can be avoided by the slight additional first cost of a larger pressure pipe.

Spiral pipe is very popular for use in the pressure line and can now be obtained lock jointed and welded so that it will carry almost any pressure required in hydraulicking.

Wherever the pipe is not straight it should be braced, particularly where there are elbows.

The dredge pump discharge pipe should, of course, have heavy walls so as to resist wear. A cheap and simple method of installing the pump suction pipe in such a way as to be able to raise and lower it into the sump, is to have a threaded nipple with flange on each side, one flange bolted to pump suction and the other bolted to a 90 degree elbow, to the other flange of which the suction pipe, is bolted.

When the suction pipe is raised and lowered, the flanges will make on or off of the nipple.

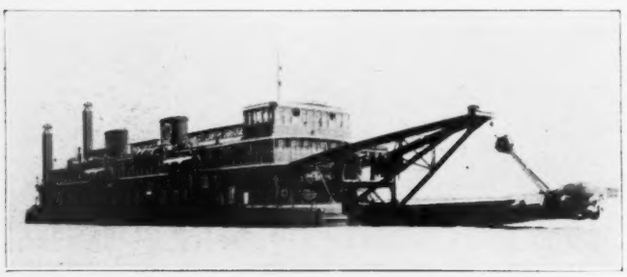


Figure 1

Hydraulic Dredges in 1928

During the past twelve months there have been no radical developments. A typical example of a high powered dredge is found, of course, in the dredge now being built for use in the Panama Canal without about 3,600 horse power available in the main engines.

There is no doubt that all large hydraulic dredges in the future will be Diesel electric with the Diesel engines driving generators direct connected and of such size units as to give a desirable flexibility in the amount of power generated to meet different dredging conditions.

One of the novel features of the dredge for the Panama Canal is the fact that each of the four main engines not only drives its main generator but also drives an auxiliary generator on the same shaft, thereby eliminating the use of the auxiliary engines and generators while the dredge is in operation.

There may be special cases where a dredge is to operate throughout its life in a very confined area that a straight electric dredge will be used, but this will be the exception rather than the rule.

Hydraulic dredges may now be built to dig anywhere a dipper dredge will dig except blasted rock, and they can also dig as deep as a dipper dredge.

The general design is more or less crystallized along the following lines:

The ladder is of heavy plate girder construction, preferably hinged in a well at the bow, which not only facilitates the arrangement of the trunnions of the ladder but also gives an opportunity for side bracing against the hull and facilitates leading the suction pipe into the hull by means of one of several types of joints. The most general arrangement, especially where deep digging is done, is to lead the suction pipe through one of the trunnions and the cutter drive through the other.

By having the ladder arranged in a well, the dredge is of shorter length over all and the differ-

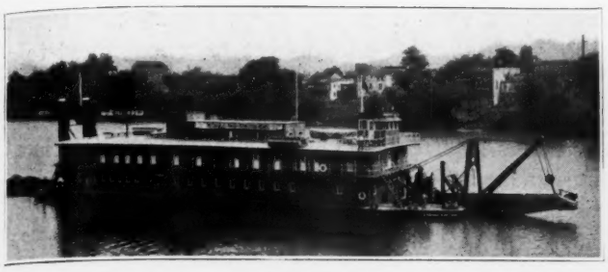


Figure 3

ence in the trim of the boat with the ladder suspended above the water or working at the bottom is much less than with the ladder mounted on a square bow.

The most usual form of cutterhead is the bird cage or basket type with renewable blades or equipped with renewable teeth.

The bow gantry supports the ladder and also acts as a tie to hold the two sides of the well in position. This gantry is, of course, pin connected and so arranged that pins can be entered before the gantry is raised. The back guys from the forward gantry extend aft and are made fast close to the sides of the boat.

The stern gantry is pin connected to the boat with rigid guys, also pin connected to the boat and also

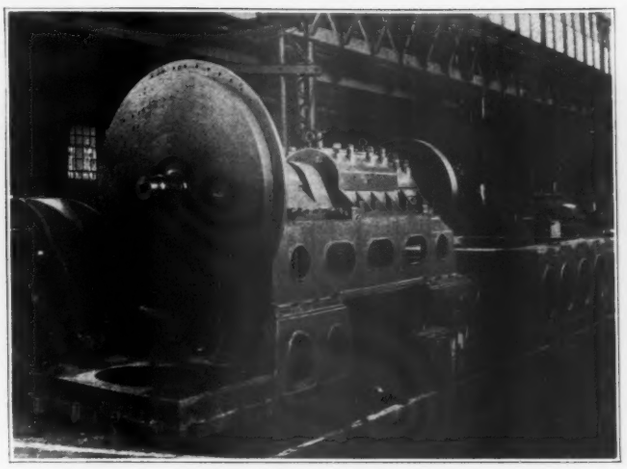


Figure 4

to the stern gantry. This gantry is made high enough so that the two stern spuds may be lifted from the top until their points clear the bottom of the hull.

All big dredges now have a bow winch with three drums, two to swing the dredge and one to raise the ladder.

At the stern is another winch with two drums for handling the spuds.

Figure 5

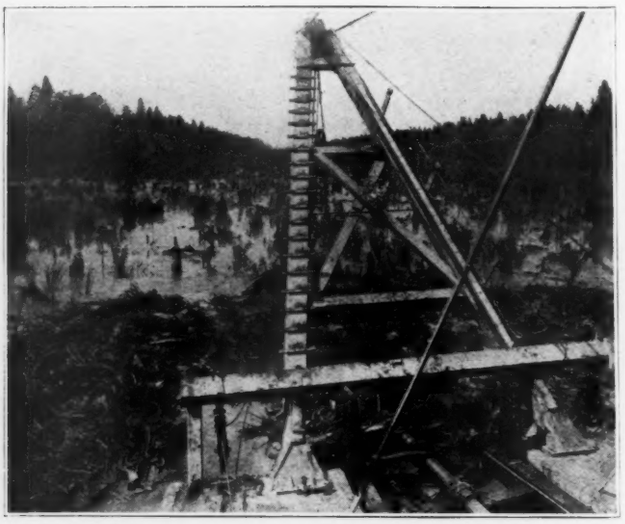


Figure 6

All dredges are laid to the pilot house, which is arranged so that good vision is obtained of the bow of the boat and also the spuds and stern.

There is, of course, always an improvement in evidence in the minor details of each dredge as it comes out, but the general features do not vary from the standard form outlined above.

As a comparison three large dredges are illustrated which have recently been built for different purposes. Figure 1 is the 24 inch dredge, "C. B. Harris," which was built for the U. S. Engineers' Department for use on the Ohio and on the Mississippi rivers. It will be noted on this dredge that there is an A frame bow supporting the ladder and that the bow gantry is also used. The cutter head is of the basket type but for fairly easy digging with a small number of blades with wide openings between the blades. The stern spuds are not hoisted from the top so that the stern gantry is very low. This construction, of course, is useful where bridges are apt to be encountered as the clearance is thereby reduced.

Figure 2 is that of the 24 inch Diesel electric dredge, "Las Cruces," built for the Panama Canal. On this dredge the stern gantry is high with the spuds suspended from it.

Figure 3 is the 30 inch hydraulic dredge, "New Jersey," built for the Great Lakes Dredge and Dock Company and intended to be used on the Great Lakes and at present is located at Chicago.

These three dredges are all Diesel-electric and are the finest and most up-to-date machines in existence.

It will be noted that on both "Las Cruces" and the "New Jersey" there is a striking similarity in the ladder and cutter arrangement and also that the forward gantry is combined with the A frame in a structure which is self-supporting and is made an integral of the hull construction.

It will also be noted that the "New Jersey" spuds are not hoisted from the stern gantry and also it will be noted that the dredge can be pinned to a certain extent on the stern spud, as indicated by the large rope sheaves on the top of each.

This is a desirable feature as in an exposed location with a long ground swell with the dredge being forced back against the spud by the resistance of the material being excavated, the spud might be lifted enough to lose its hold on the bottom, whereas if the dredge can be held down by power which is capable of taking up and easing off as the dredge rises and falls, the spud point remains fixed on the bottom.

A feature which is not often seen on hydraulic dredges can be seen on the "New Jersey," namely, square spuds instead of round ones.

Figure 4, pump shaft assembly, indicates the very heavy foundations which are used for the large pumps, the one in question being for a 24-inch pump.

Figure 5 is an unusual type of dredge, constructed from a steel vessel built for war purposes and now available at very low prices, the dredge in question being a 20-inch machine.

Figure 6 is an illustration of an old, light type hydraulic dredge digging a canal through a right of way literally covered with stumps, indicating the kind of work which can be successfully handled by this type of dredge, a thing that had never been attempted until recent years.

Workability of Cements

The efforts of the Bureau of Standards to devise methods suitable for studying the differences in workability of cements included four types of apparatus for comparing the neat cement pastes: (1) the capillary tube; (2) the ball plasticimeter; (3) the extrusion cylinder; (4) a modified MacMichael viscosimeter. A dozen Portland cements, each made at a different mill, have been studied. With each apparatus interesting data were secured.

The application of the MacMichael viscosimeter was extended to mortars. The scope of this instrument was limited as to size of aggregate and stiffness of mix, but the results emphasized the necessity of comparing the workability of a number of cements under the same conditions of mix in which they are to be used in practice. The results obtained with this viscosimeter were found sufficiently interesting to warrant the construction of a larger machine, of somewhat similar type, but capable of covering a wider range of mixes.

The study of the workability of concretes was continued, with modifications of the penetration apparatus and the deformable cylinder used in earlier work.

USE OF SLAG IN NON-METALLIC MINERALS FIELD SHOWS STEADY INCREASE IN PAST YEAR

THE use of crushed blast furnace slag as a concrete aggregate during the past year has increased steadily. Only one new crushed slag plant was put into operation during the year and, although this plant is modern and advanced in every respect, for this reason it would be superfluous to call it the model plant of the year. The plant referred to is the East Toledo, Ohio, plant of the France Slag Company, a complete description of which was published in the July 4, 1928, issue of Pit and Quarry. A brief resume of this article follows.

France Slag Company Plant at East Toledo, Ohio

The East Toledo, Ohio, plant of the France Slag Company, which started operations in May of this year, is notable not only for its modern and compact design but for the safety precautions and installations throughout the plant. The plant was designed by the company's own engineers under the supervision of D. W. Yambert, mechanical and electrical engineer.

The plant was built in the yards of the Toledo Furnace Company, the slag being brought from the furnaces by ladle cars which discharge the molten slag into cooling pits. A Bucyrus Model 95 crawler steam shovel digs the cooled slag and loads into standard 50 ton capacity railroad hopper cars which are hauled to the foot of the incline at the plant by a 30 ton Vulcan steam locomotive. The cars are pulled up this incline one at a time by a hoist designed by D. W. Yambert and built by the France Foundry and Machine Company. The hoist is driven through a gear reducer by a General Electric motor. Control, both during raising and lowering of the cars, is automatic.

The cars discharge into a 65 ton capacity steel track hopper which feeds by two 42 inch by 19 foot adjustable speed plate feeders onto a 48 inch steel apron belt conveyor operating on 36 foot centers. Two men are kept busy removing iron from this conveyor. It discharges into a Robins disc grizzly set at 4 inches. The throughs go to a 36 inch Webster roller chain bucket elevator on 129 foot centers and the oversize into a No. 8 gyratory crusher and into the same elevator. This crusher is so arranged that a piece of iron in it will automatically shut off the motor and a push button stop is used in emergencies.

The elevator takes the material to the top of the screen house where it is discharged onto a 48 inch belt on 13 foot centers equipped with a Dings 24 inch diameter magnetic pulley which chutes the iron into an iron bin. The slag goes to a 6 by 30 foot Allis Chalmers revolving screen, which separates it into the following sizes: 4 inches and up, 2½ to 4 inches, 2 to 2½ inches, and 2 inches and under. Material over 4 inches is chuted back to the crusher and the 2 to 2½ inch goes directly to a bin.

View of France Slag Company Plant From Northeast

The 2½ to 4 inch material goes to a Robins revolving disc grizzly set at 2 inches, which discharges into another bin. The 2 inch and under slag goes to a 5 by 24 foot revolving screen designed by the company's engineers and built by the France Foundry and Machine Company. This screen separates into the following sizes: 1 to 2 inch, ¾ to 1 inch, ¼ to ¾ inch, and 0 to ¼ inch, the latter going direct to a bin.

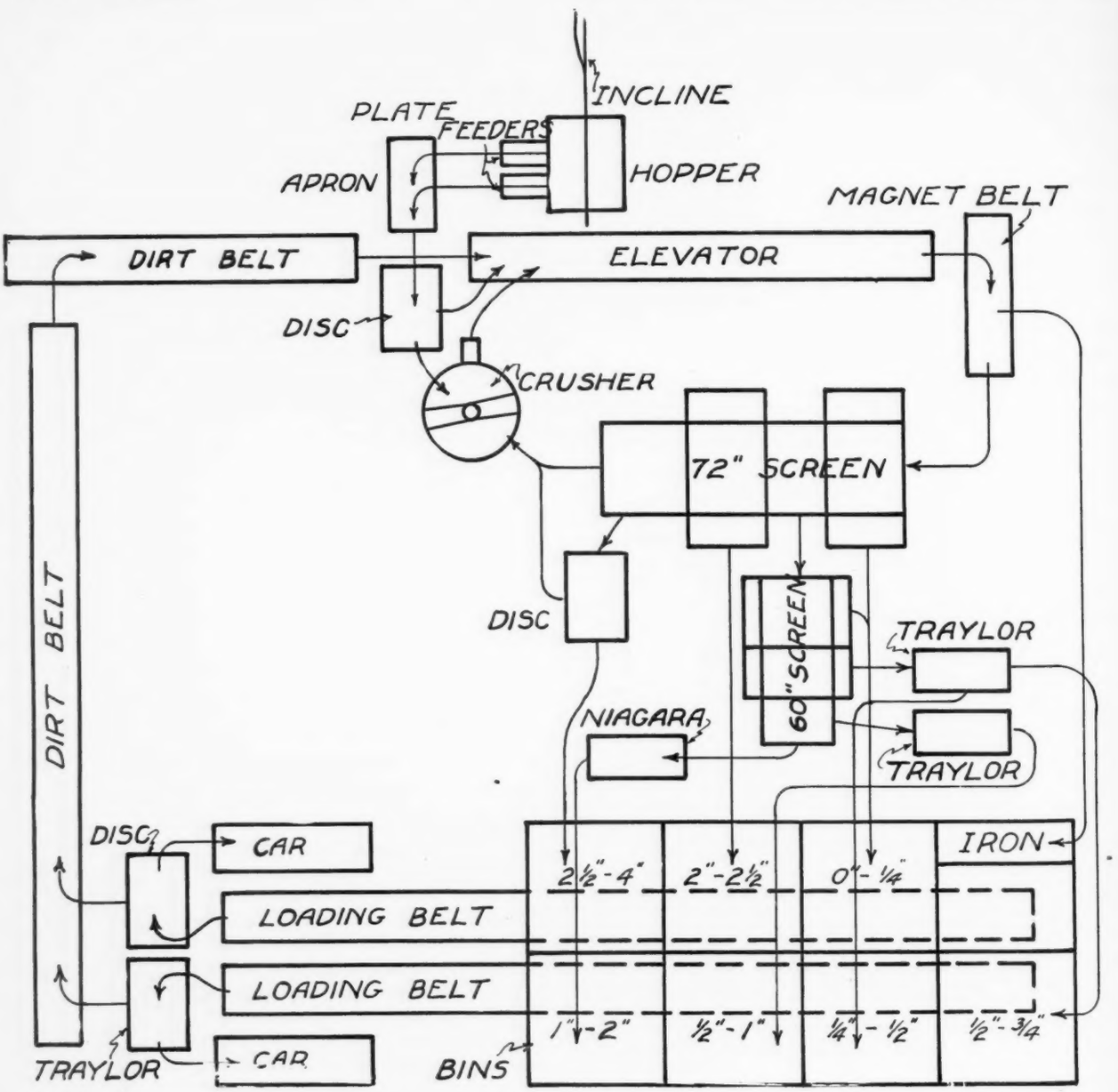
The 1 to 2 inch goes to a Niagara No. 3 vibrating screen with ⅜ inch mesh, which discharges into a bin. The ¾ to 1 inch goes to a Traylor No. 2 FB vibrating screen with ⅜ inch mesh which also discharges into a bin. The ¼ to ¾ inch material goes to a Traylor No. 2 FB double deck vibrating screen which separates it into ¼ to ½ inch and ½ to ¾ inch sizes, each going to their respective bins.

There are eight of these bins in two rows of four each. They are of reinforced slag concrete construction and have a capacity of 132 tons each. Each bin has three Blaw-Knox plate and roller type loading gates, one discharging onto a 30 inch loading belt conveyor and the other two directly into cars beneath the bins. There are two of these belt conveyors operating on 90 foot centers, one under each row of bins. Mixing of the material is done by regulating the flow from the various gates. The belt conveyor takes the material horizontally until out from under the bins and then elevates it to a final set of cleaning screens.

The coarser sizes are cleaned by a Robins revolving disc grizzly with 2 inch openings. A Traylor No. 2 FB vibrating screen with ¼ inch mesh cleans the finer sizes. The throughs are returned by underground belt conveyors to the plant bucket elevator and resized.

Individual motor drive is used throughout the plant, all except the hoist motor being General Electric totally enclosed, fan cooled, ball bearing 230 volt d.c. motors. All drive reductions except the crusher drive are encased speed reducers running in an oil bath. Two of these are W. F. Jones spur gear type and the remainder Farrel-Birmingham Sykes herringbone type. General Electric enclosed magnetic starters with time acceleration and temperature overload protection and dustproof push-button stations are used throughout the plant.

Safety precautions include a number of electrical safety features which were described in the previous article. Two electric sirens are used to give warning signals before the plant is started. In addition to this, all gears and couplings are totally enclosed, all machinery is guarded by a railing or other steel barrier, all stairways and other openings are provided with standard pipe railing and



Flow Sheet of Mill

View of Plant from South

standard toe boards. Machines are piped for lubrication so that workmen, while lubricating, are not exposed to danger.

The National Slag Association, which has its headquarters in Cleveland, Ohio, was active during the year in promoting the use of slag. A series of monthly symposiums on the characteristics and uses of blast furnace slag are being published by the association under the direction of H. J. Love, secretary-treasurer. Abstracts of these symposiums have been published from time to time in Pit and Quarry during the year. A list of these articles and the issues in which they appeared is appended.

1. Absorption in Slag and Slag Concrete—May 9.
2. Resistance of Blast Furnace Slag to Abrasion and Wear—May 9.
3. Action of Slag Under High Temperatures and Fire—May 23.
4. Manufacture and Use of Slag Products—June 20.
5. Bond in Slag and Slag Concrete—August 1.
6. Preparation of Slag for the Market—September 12.
7. Use of Slag in Concrete Roads and Pavements—October 24.

Experimental Concrete Arch Dam

As a part of a general investigation of methods for designing arch dams, the Engineering Foundation sponsored the erection and testing of an experimental concrete arch dam at Stevenson Creek, Calif. The Foundation financed the investigation largely through contributions from several organizations, and appointed a Committee of Engineers to plan and supervise the project. The Bureau assisted in preparing some of the test equipment and also by placing a member of its staff in charge of the testing, who later prepared a report on the results of the tests.

During the construction of the dam, resistance thermometers and electric telemeters were embedded in the concrete for use in measuring temperatures and strains within the dam. Provisions were made also for making measurements of the deflections of the dam, the movements of the rock abutments and the strains in the downstream face of the dam. Observations of the temperatures, strains and deflections were begun as soon as the concrete had been placed.

The load tests were made at night while the dam was kept wet by sprays in order to prevent large changes in temperature and humidity during a test. By this means it was possible to determine independently the effects of loads and of temperature changes on the strains and deflections.

The results of the tests are adequate for comparisons with the stresses and deflections calculated by the methods used in design. The "cylinder" formula which was used in designing most of the existing arch dams was found to give values inconsistent with the measured values. None of the other methods of design in current use were found to be entirely adequate in representing the conditions in the test dam, but the data supplied by the tests appear to be suitable for devising more rational methods of design.

Asphalt Paving Association Formed in Canada

The Association of Asphalt Technologists was recently formed in Montreal. Charles A. Mullen, 980 St. Antoine Street, Montreal, is secretary treasurer. The board of directors is composed of technical authorities on matters coming within the scope of the association, the object of which is to advance the technology of asphalt pavement construction. This includes the production and testing of materials used in construction, control of production and the laying of pavements and the production of materials used. The association will serve as a medium for the exchange of ideas relating to asphalt paving and research work will also be undertaken under the supervision of competent authorities. (Assistant Trade Commissioner L. A. France.)

CRUSHED STONE PLANT DEVELOPMENT IN 1928

THE past years saw considerable progress in the crushed stone industry but was not marked by the construction of many new plants. As was the case in the preceding year, activities were largely confined to remodelling and enlarging present plants and installing more modern equipment. Indications also point to a similar condition during the coming year. There were two plants which are representative of modern plant design. These are the Illinois Electric Limestone Company's plant near East St. Louis, Illinois, and the plant of the H. T. Campbell Sons Company at Towson, Maryland.

The Monon Crushed Stone Company

The plant of the Monon Crushed Stone Company at Monon, Indiana, is an old established plant which has grown steadily until today it has a capacity of 2,000 tons per day. The August 1, 1928, issue of Pit and Quarry carried a complete description of the plant.

Marion steam and electric shovels load into Austin steel dump cars which are hauled to the plant by four 13 ton steam locomotives. One of these is a Davenport, one a Baldwin, and the other two are of H. K. Porter make. Two Allis-Chalmers Hoists haul the cars up an incline to the No. 18 Allis-Chalmers primary crusher.

Plant equipment includes an Allis-Chalmers scalping screen, four revolving screens of which two are Austin and two Allis-Chalmers make, and six auxiliary crushers. Three of these are Allis-Chalmers No. 3, one a No. 8 and the other two No. 37A Kennedy-Van Saun. Two shaker screens complete the equipment. Nine frame bins under the screen house have a capacity of 1,000 cars and discharge into both cars and trucks.

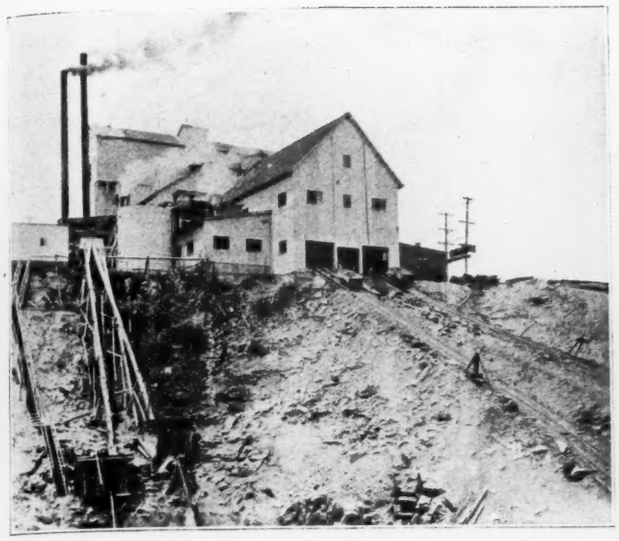
Loading Cars in Quarry at Monon

The Harry T. Campbell Sons Co.

The new plant of the Harry T. Campbell Sons Company at Towson, Maryland, which went into operation in April, 1928, is a good example of a permanent installation operated by an old and established company. The plant, which has a capacity of about 175 tons per hour, was designed by Soule and Zepp, consulting engineers, of Baltimore, Maryland. A feature is that all power is generated and equipment operated by Ingersoll-Rand oil engines.

Stripping is done by an Erie steam shovel loading into Koppel dump cars hauled by a gasoline locomotive to a dump. The bench method of quarrying is used, blast holes being drilled with Ingersoll-Rand and Gardner-Denver jackhammers. Erie steam shovels load into Mack trucks which haul

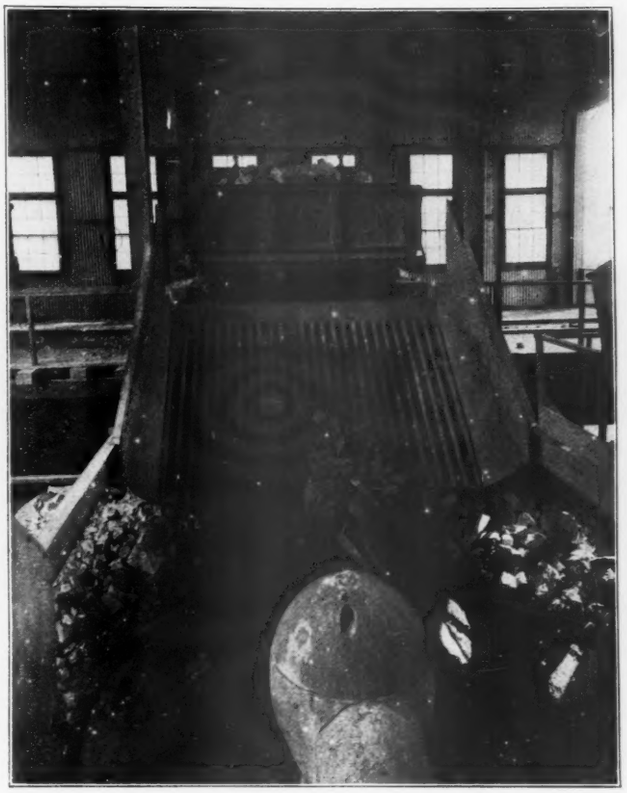
View of Dolese and Shepard Plant Showing Part of West End of Quarry



Monon Crushing and Screening Plant

the stone up a concrete roadway to the plant and dump into the primary crusher hopper. The storage bins of concrete were erected under the supervision of the MacDonald-Spencer Engineering Company and the buildings of structural steel covered with sheet metal siding were fabricated and erected by the Maryland Metal Buildings Company.

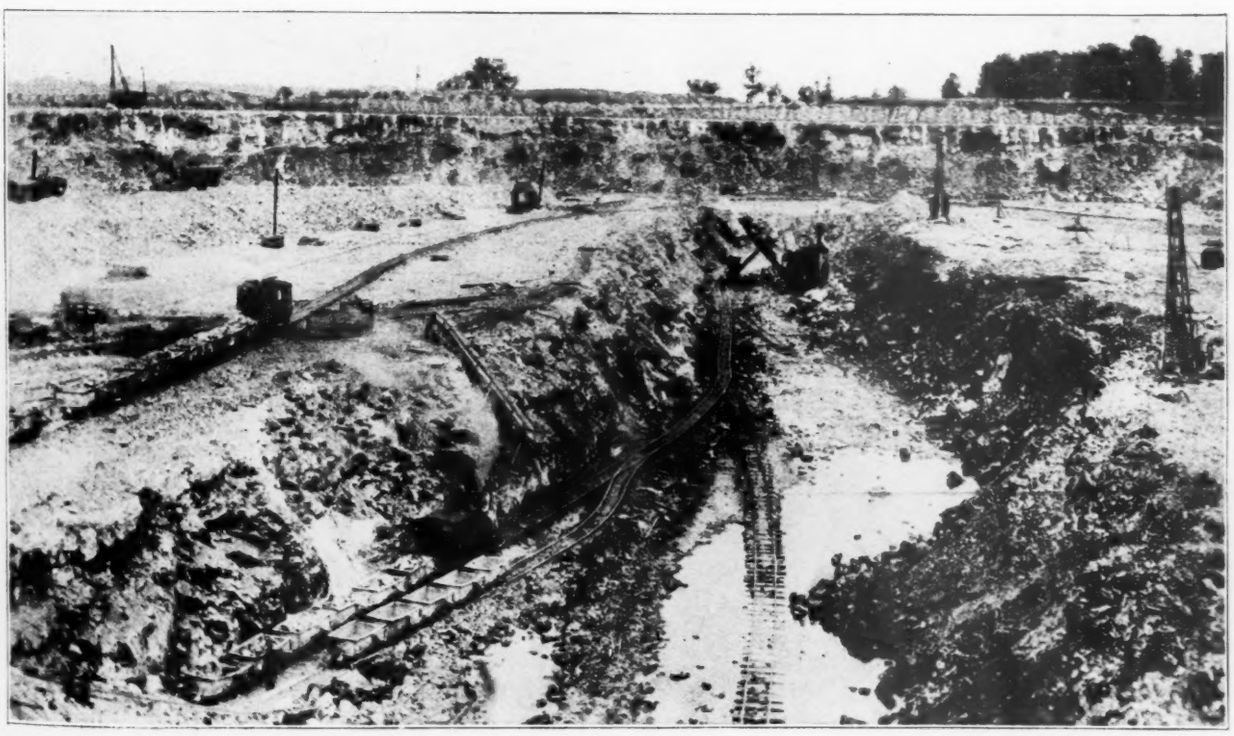
Plant Equipment includes Smith Engineering Works crushers, Allis-Chalmers and Galland-Henning screens, Ingersoll-Rand air compressor and oil engines, Hewitt gutta-percha belting and McNamara Brothers Company elevator buckets. Blaw-Knox batchers under the bins load directly into trucks for delivery. Railroad cars are also loaded direct from the bins.



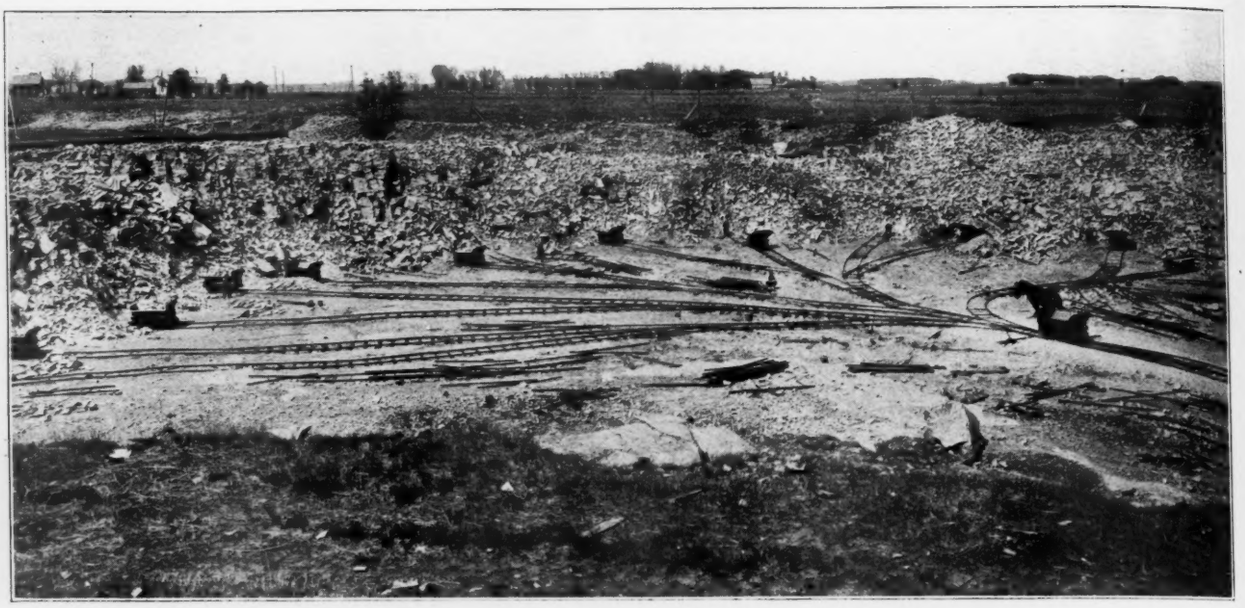
Car Dumping to Primary Crusher at Dolese and Shepard Plant

The Northampton Quarrying Company

The Northampton Quarrying Company of Northampton, Pennsylvania, last winter remodeled its plant and added new equipment. The entire scheme of operation was completely changed and the plant went into operation this spring with its capacity increased to about 450 tons per day.

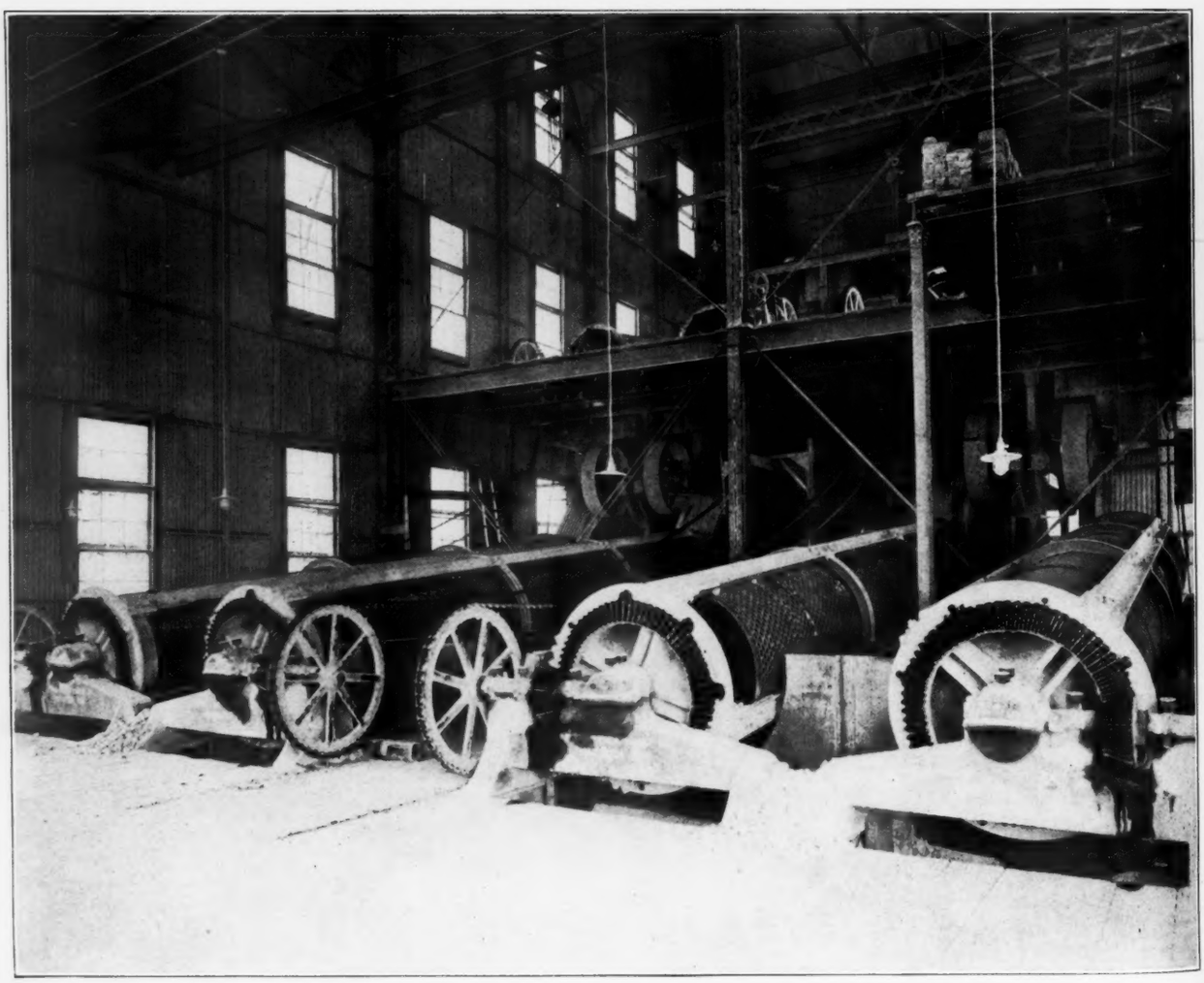


General View of Monon Quarry Looking East



General View of Dell Rapids Quarry of L. G. Everist, Inc.

A Marion No. 28 steam shovel does the stripping. Blast holes are drilled by Loomis Clipper drills and secondary drilling is done by Ingersoll-Rand jackhammers. Cars haul the stone to the plant incline where they are raised by a Flory hoist and discharge into a No. 20D Champion crusher. The remaining equipment consists of a No. 6 Champion crusher, a No. 4½ Traylor finishing crusher, a 38 inch by 18 foot Champion revolving screen, a Jeffrey belt conveyor and a Good Roads elevator.



Interior of Dolese and Shepard Screen House Showing Two Floors of Rotary Screens

L. G. Everist, Incorporated

L. G. Everist, Incorporated, acquired a plant at Dell Rapids, South Dakota, and after rebuilding and improving the quarry built a new plant which went into operation early this year. The plant has a capacity of about 600 tons per day.

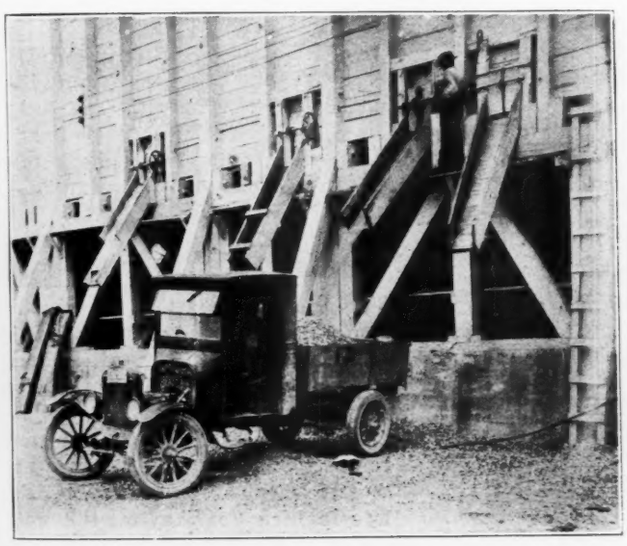
Blast holes are drilled by an Ingersoll-Rand drifter drill. Koppel 2 yard dump cars are used to carry stone to the crushing plant. A 10 in. Allis-Chalmers McCully crusher, a Gates 60 in. by 12 ft. revolving screen, and a vibrating screen make up the major plant equipment. Allis-Chalmers electric motors are used to drive all equipment.

Dell Rapids Plant of L. G. Everist, Inc.

The Illinois Electric Limestone Company

The Illinois Electric Limestone Company early in March, 1928, put into operation a new plant at Falling Springs, Illinois, about 8 miles southeast of St. Louis, Missouri, which has a capacity of about 2,500 tons per day and can be increased to double that amount. The plant was designed by the Kennedy-Van Saun Company and the equipment supplied by the Kennedy-Van Saun Manufacturing and Engineering Corporation.

A 2 yard Marion No. 37 electric shovel does the stripping. A Cyclone well drill is used for blast holes and a 2½ yd Marion Type 490 and a 2 yard Marion No. 37 load the stone into 4 yard Western side dump cars. They are hauled to the plant by three Whitcomb gasoline locomotives.



Loading Truck From Bins at Monon

The plant is of wood frame construction with corrugated iron sheathing and is built on concrete foundations. Equipment consists of a No. 36 gyratory primary crusher, two No. 49 secondary crushers, and two No. 37 finishing crushers, all of Kennedy-Van Saun make. All of the screens are Kennedy-Van Saun revolving type and include an 84 in. by 12 ft. scalping screen, two 72 in. by 18 ft. secondary screens and three 72 in. by 24 ft. finishing screens. Bucket elevators are all Kennedy-Van Saun and Fairbanks-Morse electric motors are used throughout the plant. The storage bins are of the louvre type and discharge into either cars or trucks.

The Dolese and Shepard Company

The Dolese and Shepard Company operates a crushed stone plant near McCook, Illinois, which, although nearly 20 years old, remains one of the outstanding plants in this part of the country. The plant was designed and built by the J. C. Buckbee Company, engineers, and was of such advanced design that no important changes have yet been found necessary. A complete description of this plant was published in the October 10, 1928 issue of Pit and Quarry.

Stripping is done by a No. 24 Buckrus 3½ yard dragline and a 50B 1 yard shovel. Sanderson Cyclone well drills are used for the primary and Sullivan and Ingersoll-Rand pneumatic drills for secondary drilling. A 4 yard Osgood Model 120, two 4 yard Buckrus Model 110 and three 3½ yard Bucyrus Model 95 steam shovels load the stone into 11 yard cars which are hauled to the plant by a Woodford electric haulage system. The cars discharge into the Allis-Chalmers No. 18 primary gyratory crusher.

Plant buildings and conveyor housings are of structural steel and corrugated metal and all foundations and storage bins are concrete. Plant equipment consists of the following Allis-Chalmers machinery: two No. 9 and four No. 6 gyratory crushers, two 54 by 24 inch rolls, two 48 inch by 24 foot scalping screens, four 48 inch by 28 foot and four 48 inch by 24 foot revolving screens and four shaker screens. There are also two Traylor vibrating screens.

Some Machinery Developments in 1928

Every year brings new developments of machinery used in the pit and quarry field. During the year, each issue of Pit and Quarry has contained data on their developments and applications to our field. In this Annual Number, we present information, covering a large number of 1928 developments that have not been previously discussed, as well as a number on which additional data has been secured. While this review does not presume to cover all the mechanical developments of the year, it contains a large proportion of them.

Large Revolving Shovel

New Large Dragline Of Special Walking Type

There are several means of moving excavating machinery about. The most usual method for years was on skids and rollers or trucks mounted on tracks. These involved a great amount of labor in moving and several other types of moving devices have been applied.

The most usual one is the crawler tread or caterpillar. There are, however, several exceptions to this almost universal practice.

The Bay City Dredge Company for years used a system of pads and spuds on their so-called dredges. The Page Engineering Company a short time ago brought out their own system of spuds and pads. The Monighan Machine Company has for several years supplied dragline machines with a special walking device of their own. The novelty in the machine illustrated is not the type of walking device but the fact that it is the first machine so far built employing this device for moving. This machine is shown on the Dallas Reclamation Project and is owned by the Trinity Farm Construction Company. It is here shown building a levee on ground prepared by plowing. This machine is driven by a Diesel engine of 240 h.p. The boom varies from 100 to 150 feet in length, depending upon the size of bucket.

The base diameter is 27 feet 6 inches, having a total bearing area while in operation of 555 square feet, bringing the pressure per square foot down to 864 pounds. The Bay City machines operate with a bearing pressure of about 450 pounds per square foot while most of the caterpillar tractions are based on about 1700 pounds per square foot. The bucket sizes on this machine range from 6 cubic yards on a 100 ft. boom to 4 cubic yards on a 150 ft. boom.

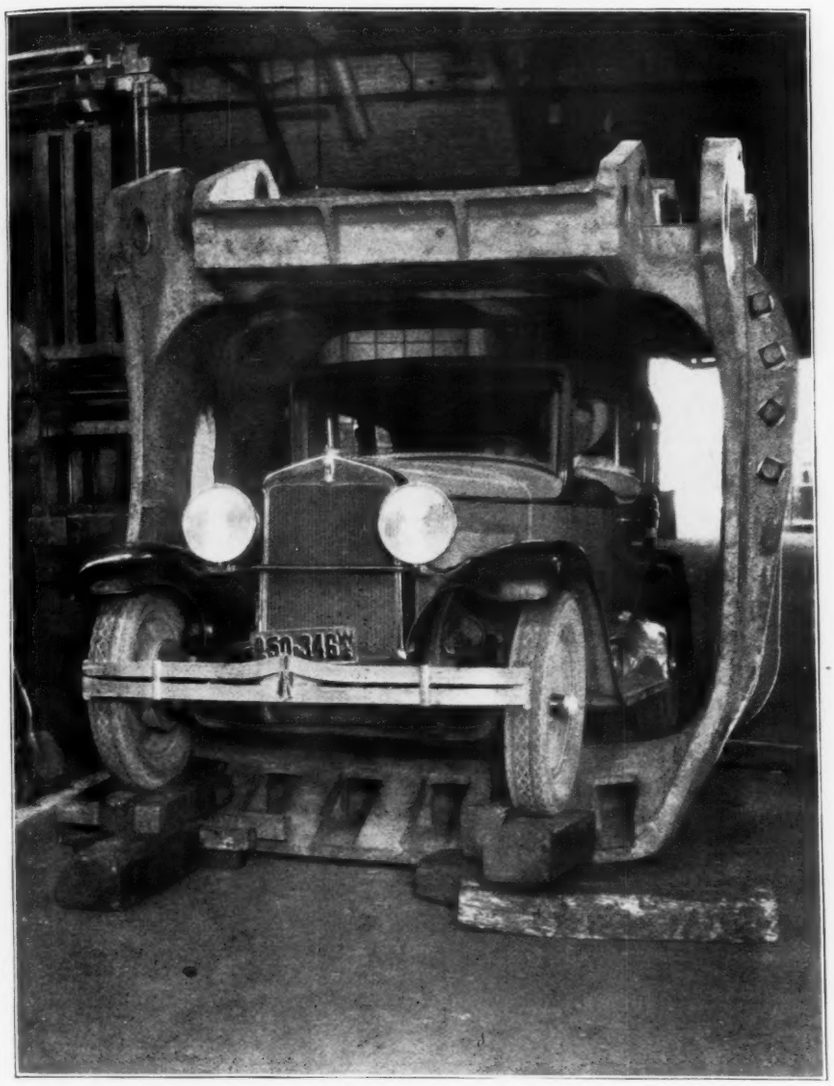
Large Dragline of Special Walking Type

Large Stripping Shovels

For stripping shallow deposits by digging and overcasting the overburden, piling it up in the area which is mined out immediately after being stripped, the large revolving stripping shovels have been designed and increased in size as the demand grew for stripping deeper deposits. The largest machine constructed by the Bucyrus-Erie Company for this work has a dipper of 12 cubic yards, a dumping radius of 101 feet and a clear dumping height of 77 feet 6 inches above the level on which the shovel stands. This machine weighs about 900 tons and has an over-all width over the caterpillar treads of about 43 feet. The operating platform is about 22 feet above the ground.

This shovel will make better than a cycle a minute. In fact, the average would be about 24 complete cycles, including a 90 degree swing, in 15 minutes. The machine moves up in less than a minute.

This machine is operated by three men, one operator, one oiler and one pit man, or the oiler may also be an operator and alternate with the oper-



Showing Dipper with an Automobile Inside

ator in running the machine and oiling.

The machine is usually installed as electric with Ward-Leonard control. There are two motors driving the hoist and two separate swinging motors driving their own pinions at opposite ends of a diameter of the rack circle. One object in using the two motors instead of one is to reduce the inertia effect of the armature.

There are several novel features on this shovel, in addition to its size. For instance, the bucket is made up of two steel castings with a horizontal joint from back to front, this joint being keyed to take the shearing strains off of the bolts.

The front of the dipper is trussed or in the form of a beam so that it offers a much greater resistance to deformation when it is dropped or when being crowded into the bank.

There is no dipper bail.

There are four hoist ropes, two taking hold of the dipper at each rear corner. The dipper handle is a spread handle, so that the dipper receives the thrust from the dipper handle at the rear outside corners and the hoist line also is attached at these points, so that the thrusting and hoisting are applied to both sides of the dipper instead of at the middle as formerly.

The two boom suspensions which take hold on the two sides of the boom near the upper end are entirely independent of each othr. One end of the suspension on either side is carried from the A frame forward and takes hold of the extreme end of the shipper shaft. This line not only helps to support the boom at this point but also counteracts the twisting effect of the boom by the handle.

The boom is 95 feet long, of box construction, and the dipper handle is 64 feet long.

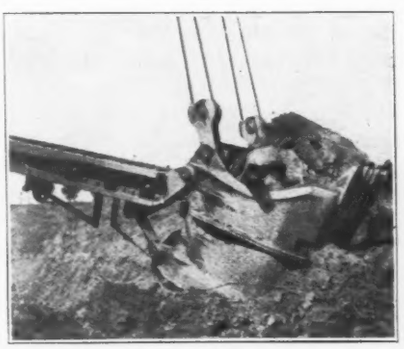
The machine is mounted on 8 caterpillar treads arranged in four pairs, two of these pairs support the lower base of the machine directly while the other two support the two ends of an equalizing beam which supports one side of the base at its middle point.

The whole traveling arrangement of the machine is such that no strains can be set up in the frame due to the unevenness of the ground, as each pair of treads adjusts itself to the ground readily, and the equalizing beam takes care of the inequalities for the machine itself. The jack screws which are used to support the corners of the lower base on the ends of the equalizing beam when the machine is standing still are motor driven.

The machine is operated entirely by controller levers and there is a complete absence of clutches and brakes on the main machinery. Instead of the usual outside bandbrakes, regenerative electric braking is used so that when the dipper is being lowered into the cut after dumping, instead of burning out brake bands, the hoist motors act as generators and the resistance thus offered has a retarding effect on the dipper, thus taking the place of the old style brake.

The illustration of the dipper with an automobile inside of it gives the best possible idea of its size, and the other illustration of the dipper shows the horizontal joint with beam front and the corner attachments. It will be noted from the illustrations that the dipper handle hinge casting takes hold of the upper dipper casting and the pitch braces take hold of the lower half of the dipper. The main thrust from dipper handle, the pull of the hoist ropes and the digging effect on the teeth and the dipper are concentrated in the upper casting.

Some idea of the work which this shovel performs at every dip, may be gathered from the statement that it handles a net load of material hoisted of 18 to 20 tons, picking it up from the ground on which the shovel stands and depositing it at an elevation which would be that of a flat roof of a seven story building, the center of the machine being located at about 95 feet from the side of the building. Notwithstanding the weight of this



Showing the Horizontal Joint

A Walking Drag Shovel

machine, the bearing pressure does not exceed 6,000 pounds per square foot of bearing surface.

Drag Shovel Attachments For Dragline Machines

Back hoes have been available for some time as attachments for small revolving convertible shovels or draglines.

The use of the back hoe enables the machine to stand ahead of the trench and yet do positive digging as regards depth and alignment, which is not possible with the ordinary dragline machine and bucket.

The Page Engineering Company has recently brought out a drag shovel attachment which consists of a bucket almost identical with the body of the ordinary Page dragline bucket. It is pin connected to the bucket arm at a point slightly above the hood of the bucket and is free to turn about this pin. The turning of the bucket, however, is controlled by the loading line and the hoisting line.

The loading line rotates the bucket into a carrying machine as well as loads the bucket in the ordinary dragline manner.

When the bucket is being hoisted, tension is maintained on the loading line until the bucket has reached the dumping point. When tension on the loading line is released, the hoisting line revolves the bucket into a dumping position.

By referring to the illustration, it can be seen that one end of the hoisting line is fastened to the bucket at a point which allows it to rotate the bucket so as to dump the bucket. The action of the bucket is exactly like the action of the ordinary dragline bucket except that it is held down and cannot slide over the work as the dragline bucket does.

It is claimed that this equipment will dig in hard material. This equipment may be attached to dragline machine more readily than the back hoes.

A New Idea in 2 Yard Shovels

Heretofore 2 yard shovels have required a considerable amount of knocking down for shipping and a corresponding amount of erecting upon arrival at the job, although smaller shovels have been shipped intact requiring only running the shovels off cars to be ready for work.

The Link Belt Company has recently bought out a 2 yard shovel which is equipped, for shipping, with a special crawler tread which is entirely within the 10 foot 4 inch overall width required by the railroads.

Upon arrival at the work, the machine is run off the car, the special treads removed and the standard treads placed in position. The special treads may be returned to the factory or may be retained for further use when shipping.

In order to come within the height clearings limitations of 16 feet above the top of the rail when loaded on a flat car, this shovel has been equipped with a collapsible mast and also a special arrangement of house which is evident from the illustration, the upper portion of the sides and the outer portions of the roof being capable of adjustment for shipping so as to come within the clearance lines at the sides of the house. The machine in the illustration is equipped and being used as a dragline.

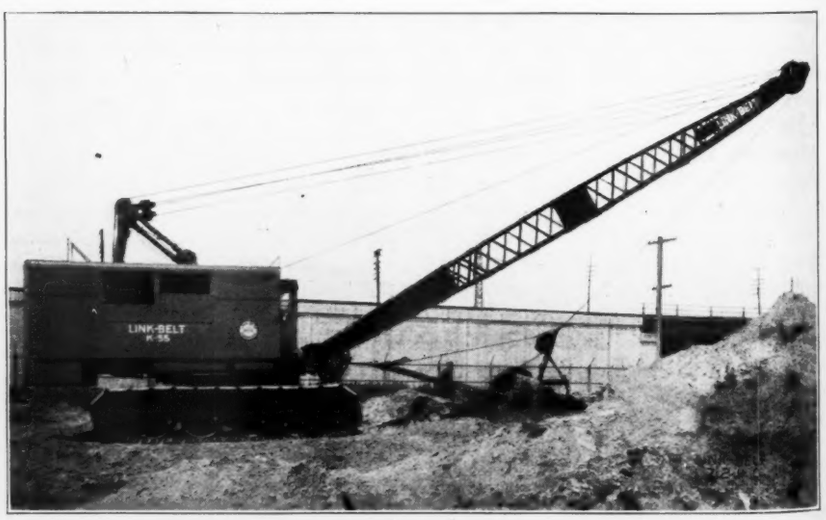
This equipment makes it possible to use a larger machine than has heretofore been used for comparatively small jobs.

When the machine is in working condition, it is 12 feet wide overall at the lower frame and the crawler treads are 36 inches wide. It is driven by gasoline engine, electric motor, or Diesel engine drive.

A Record of Marion Achievement

The Marion Steam Shovel Company has presented several new developments in excavating machinery in 1928.

The first was the 12 cubic yard,



Link Belt Dragline

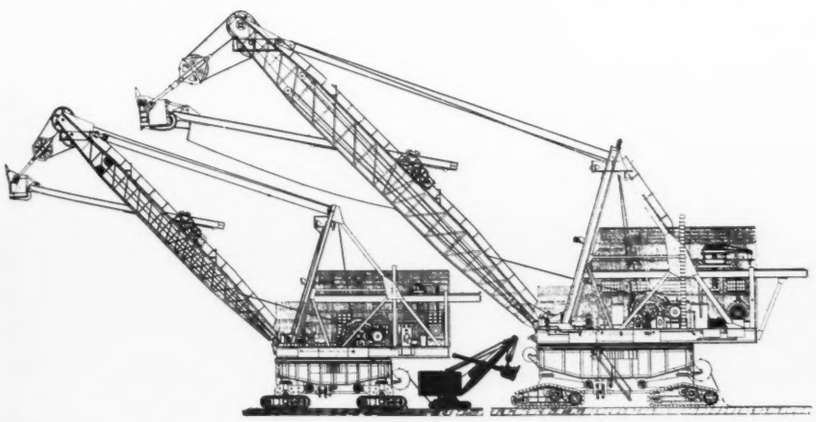
Type 5480 electric of which six are already in service and several more are in production. This shovel is a logical outgrowth of the Type 350 which has been well known for the past five or six years. This latter shovel is an 8 cubic yard unit weighing about 580 tons and mounted on crawlers. The Type 5480 is a 12 cubic yard unit having 90 foot boom, 60 foot handle and weighing about 850 tons, crawler mounted. It is built for electric operation, Ward-Leonard control only. Where the Type 350 mounted a 435 k.v.a. synchronous a.c. motor for driving the necessary d.c. generators, the Type 5480 mounts an 800 k.v.a. synchronous motor. Where the Type 350 had 375 kw.d.c. generators the Type 5480 has 750 kw. Where the Type 350 had 500 hp. of d.c. motors for the 3 major functions of shovel service viz.: hoist, swing and crowd, the Type 5480 has 900 hp. The first one put into service has been successful.

The second advance is one making for fuel economy. It is the development of two Diesel powered shovels—one of 2 cubic yard capacity and one of 1¼ cubic yard. These are not the ordinary converted gasoline shovels of which there are several on the market. They are Diesel powered but electric-driven. They, therefore, mark another milestone in the progress of the excavating equipment towards the internal combustion engined electric shovel.

The 2 cubic yard Diesel-Electric is in the line of succession to the Type 37. This line is the Type 480 group—steamers, electric with rheostatic control, electrics with Ward-Leonard control and Diesel-Electrics. The Diesel used in the 2 yard unit is a Winton 6 cylinder, 4 cycle, airless injection engine developing 150 hp. at 750 r.p.m. It has a 7 bearing, 4¼ inch diameter crank shaft and is direct connected to a 50 kw. (continuous) drooping voltage generator which supplies current to the 3 mill type, roller bearing, fan ventilated, mica insulated, d.c. motors. The Diesel used in the 1¼ cubic yard Diesel electric unit is a Buda M.A.N. 4 cylinder, 4 cycle, airless injection engine developing 92 hp. at 1000 r.p.m. It has a 5 bearing crank shaft and is direct connected to a 25 kw. drooping voltage generator. The motors are mill type and of the same construction as those on the 2 yard unit.

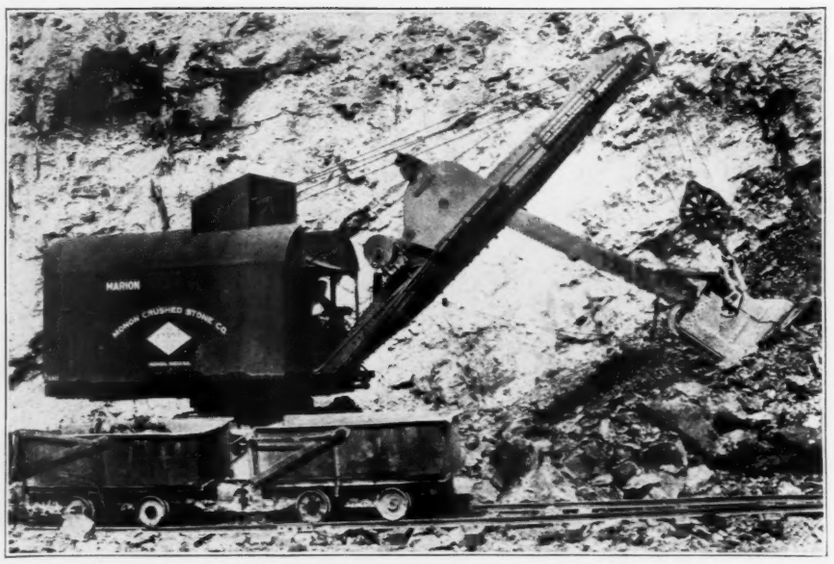
A Convenient Small Shovel

The world's first 15 cubic yard stripping shovel now being assembled



Relative Proportions of the Types 5600, 5480 and 450, respectively 15, 12 and 1¼ Cubic Yard Capacities

A Twelve Yard Type



A Full Revolving Shovel in Action

is Marion's Type 5600. Where the 12 yard unit Type 5480 has 90 foot boom, 60 foot handle and 12 yard bucket the Type 5600 has 120 foot boom, 83 foot handle and 15 yard bucket. Where the Type 5480 weighs 850 tons the Type 5600 weighs 1550 tons. Power plants are in similar proportions. This will be by nearly 100 per cent the largest stripping shovel in the world.

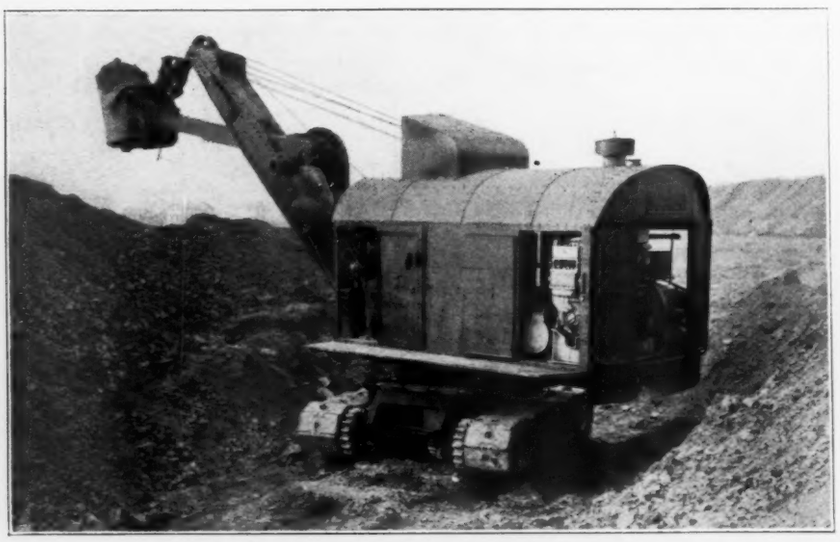
General Makes Improvement On Machines

The General Excavator was designed for efficient service as a shovel, clam shell, dragline, skimmer, crane and backfiller. It is said to be of extra heavy construction with ample reserve power to handle the unusual overloads and demands made upon machines in the different services. This excavator operates with either gasoline or electric motor as the flexibility and economy of these forms of power are accepted. It is full revolving and mounted on continuous treads. A complete description of these machines, together with illustrations, is given in Bulletin 2805. Within the last year, a number of places formerly occupied by gasoline motors have been replaced with electric motors. This substitution does not change the operation of the machine in any way.

Showing Electric Motor in Position Often Occupied by Gasoline Motor

Hanson Improved Excavator

The Hanson Clutch and Machinery Company announces a new improved model '29 excavator. Quite a few minor changes have been made in this new model tending toward greater strength and performance. A new super boom has been incorporated including extra heavy crowd mechanism throughout. A later design and still more powerful series of Hanson patented clutches have been included as well as enlargement of many shafting and bearing specifications. New and improved treads which are now manufactured by the Hanson Clutch and Machinery Company insure the maximum of tread efficiency and service. At the same time nothing has been sacrificed in the way of simple control, speed, flexibility and power. The model '29 Hanson takes its place as a leader in the light power shovel field.



A Two Cubic Yard Machine

The Hanson Clutch and Machinery Company will also announce the new Hanson Truckrane at the show. This unit incorporates all the excellent features of the crawler type crane in addition to which it offers a still more

A Late Addition to the Field

compact mechanism combined with its ability to move from one job to another at truck speed. Through an especially designed arrangement it is able to lift maximum loads without the use of outriggers and without interfering at any time with the mobility of the truck.

New Trackson Addition

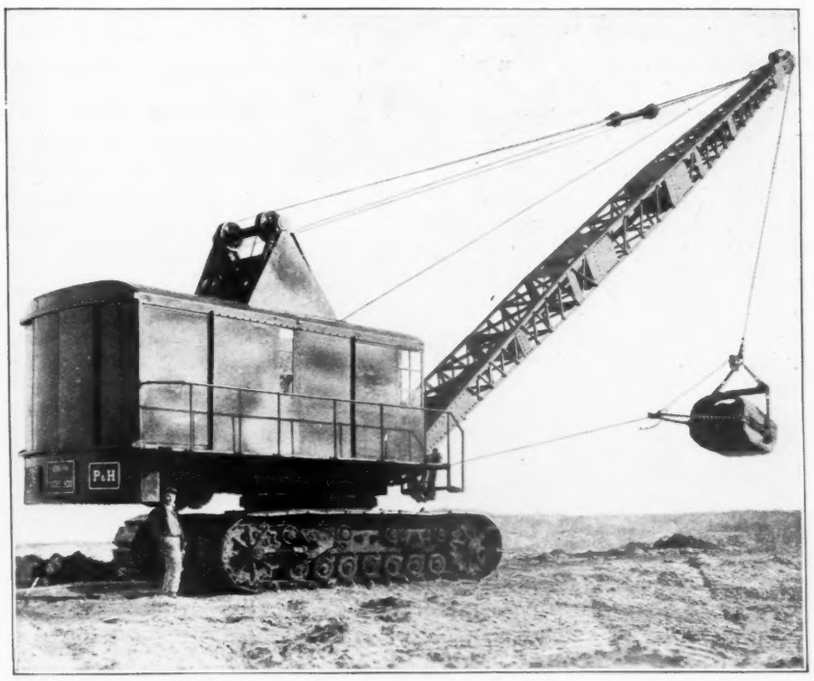
The Model DH Trackson full crawler which is adapted to mounting on the McCormick-Deering 10-20 Industrial Tractor, was a development of the past year in the tractor and equipment. It is manufactured by the Trackson Company.

This model of the Trackson converts the McCormick-Deering into a 3½ ton unit that has tremendous power and strength without being cumbersome; that is economical in operation; adaptable to use with many different lines of auxiliary equipment; and is able to get a sure footing and maintain traction in the most difficult ground conditions.

It is rugged in construction and simple in design. The amount of power which is provided by the International motor is geared to the ground by the Trackson full crawlers. These crawlers also add weight for bearing down on hard pulls; increase the tractor's flexibility; make shorter turning radius possible; and enable the unit to work in soft, loose ground such as sand, gravel, cinders, etc., and in swamp, slippery clay, and snow where wheel tractors or teams would be practically helpless.

The crawler is constructed on simple, clean lines with plenty of clearance between it and the power plant to permit the actual building in of auxiliary equipment such as hoists, loaders, shovels, bulldozers, graders and plows.

An efficient unit for pit and quarry operations is provided by equipping the Model DH Trackson McCormick-Deering with the Trackson shovel, which is made by the same company. This three piece outfit is economical equipment for such operations as stripping, picking up rock and transporting it to the crusher, excavating, loading dump cars, and removing waste materials around the company's yards. It will handle any materials that are movable such as dirt, rock, shale, coal, cinders, gravel, refuse and building materials.



The New P&H Model 900 Operating as a Dragline

A Trackson Model

The shovel may be mounted on either the crawler unit or the wheel tractor, but the former is desirable for work in soft or loose ground conditions and also for operations where frequent turning in close quarters is necessary. Because it is a front end attachment the Trackson Shovel leaves the drawbar of the tractor free at all times for other purposes. It also enables the operator to control the picking up and the placement of the load accurately, which is not always the case with rear drawn attachments.

P & H 3½ Cubic Yard Excavator

A new excavator of 3½ cubic yards capacity has been added to the line of gasoline, Diesel, and electric powered shovels, draglines, and crawler cranes manufactured by Harnischfeger Corporation. It is known as the Model 900, and its general design closely resembles that of the four smaller unit cast steel machines built by this manufacturer.

The revolving frame, carbody, and corduroy frames are single piece annealed steel castings—fully machined at bearing points. The revolving frame of the Model 900 weighs 17,000 pounds and its overall length is 19 feet 6 inches. This massive casting provides a rigid foundation for the main machinery—including a 175 horsepower, six cylinder Diesel engine.

Roller bearings throughout the main machinery of the upper structure reduce waste power to a minimum. The four double sets of swiveled, conical steel swing rollers, which carry the weight of the revolving structure, are also provided with anti-friction roller bearings.

The new machine is provided with a box girder shovel boom, outside dipper sticks and a 3½ cubic yard dipper. The machine is also equipped with a 3½ cubic yard bucket, for dragline work. Smaller buckets are provided when the nature of the work makes it necessary to use booms of unusual length.

All gears of the traction mechanism are completely enclosed in heavy cast steel gear cases and run in a bath of oil. Bearings in the lower structure are provided with renewable bronze bushings.

The Model 900 is exceptionally mobile for an excavator of this size. Steering brakes are provided—making it possible to turn the machine squarely around or in any desired radius. The tractions are gear driven and are of the P & H double sprocket, non-clogging type.

Its over-all width is 14 feet 6 inches and the over-all length is 25 feet.

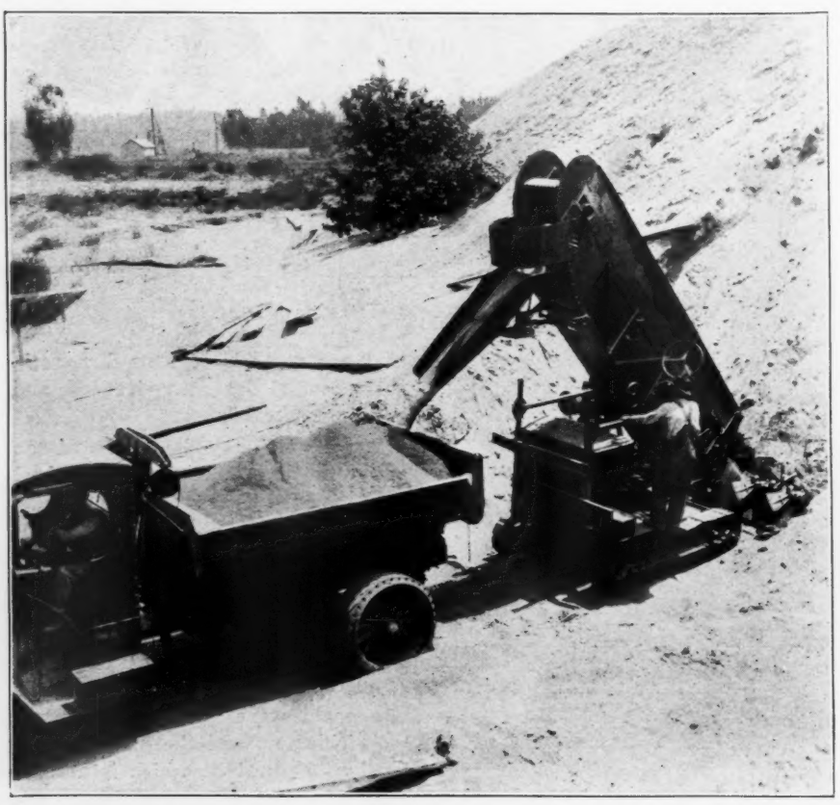
Like all other full revolving excavators, manufactured by Harnischfeger Corporation, the Model 900 is convertible for use as shovel, dragline and crane.

New Developments in Haiss Model 27 Loaders

As loaders are still being put to new and more strenuous uses it is found advisable to keep at least one step ahead of the usual strength demands. For this reason the Geo. Haiss Manufacturing Company has made several very important changes on loaders during 1928. Anticipating a more stringent use of these loaders in 1929, manganese steel has been more generously used. Many of the parts of this material have been increased in size.

One of the most vital parts of a truck loader is the creeper. In the past, the self clearing design of Haiss creeper loaders has met with success, the wear on the various creeper members being only nominal. But to insure further dependability, the Haiss Company has made several improvements in the details of the creepers.

Track pin sizes have been increased for greater bearing areas. And in doing this the entire track frame was redesigned in order to maintain the high factor of safety peculiar to Haiss machines. The bearings in the track rollers and in both the front and rear creeper sprockets have also been increased in size. As a result of these refinements it is safe to say that the thoroughness of Haiss engineering design is producing a machine of exceptional quality. After a thorough investigation, both technical and practical, by Haiss engineers, it was decided to redesign the present style of swivel spout usually used on Haiss loaders. The proof of the investigation has been demonstrated in the greater discharge efficiency of the machine.



A Creeper Mounted Loader, Loading Sand Direct from Bank

An Engineers' Conclusions

In the conveying, elevating and screening machinery field Stephens-Adamson Manufacturing Company reports that the development during the past year has been toward units of larger capacity and more sturdily built than ever. To withstand the tremendous shocks imposed by the large tonnages and heavy materials handled, steel, both structural and cast, is being used to a greater extent than ever before.

With the advent of larger, heavier, more costly units, Stephens-Adamson engineers have redoubled their efforts to impress the importance of adequate lubrication as a means of decreasing maintenance costs and increasing the life of equipment. High pressure lubrication fittings are used wherever possible and every effort has been made to place fittings in the most accessible locations.

The New Haiss Excavator

The long felt need of a machine capable of making relatively wide, shallow cuts of depth ranging from skimming to about three or four feet has been met with the new excavator manufactured by the George Haiss Manufacturing Company. Primarily, this machine has been designed as a

Newly Developed Loader for Stockpiles

highway excavator or grader which eliminates the necessity of plowing or scarifying, preparatory to removing surface material, but it is by no means limited to work of that kind only. It will dig in any material which will yield to pick and shovel.

Briefly, the new excavator is a machine of the bucket dredge type, with an 8 foot tail shaft extending equally each side of the bucket and on which are placed digging picks and inclined feeding propellers of manganese steel. As the tail shaft revolves with the elevator train, the picks and propellers respectively loosen and feed an 8 foot swath of spoil to the endless chain of manganese steel toothed buckets. Each bucket, in turn, digs out its load of broken material and conveys it to the discharge point from whence it may be placed in trucks or at the side of the cut. The excavator is creeper mounted, the mounting being of such a width that the entire machine can travel on the finished grade. By this arrangement, should the particular use warrant, successive cuts may be taken to reach the desired depth of excavation.

In one case, the machine is used to excavate, preliminary to concreting, an ordinary clay road of several years standing. Here, the excavator cuts an 8 foot swath, 12 to 18 inches deep, at its crowding speed of 4 feet per minute. The entire action of the machine is continuous, there being no lost motions between the simultaneous digging and discharge operations. By obviating plowing or scarifying to reach grade, the excavator reduces the expense of grading work about 40 per cent and since highway widening and building is frequently in eight and multiples of eight foot widths this new machine is particularly adapted to such work.

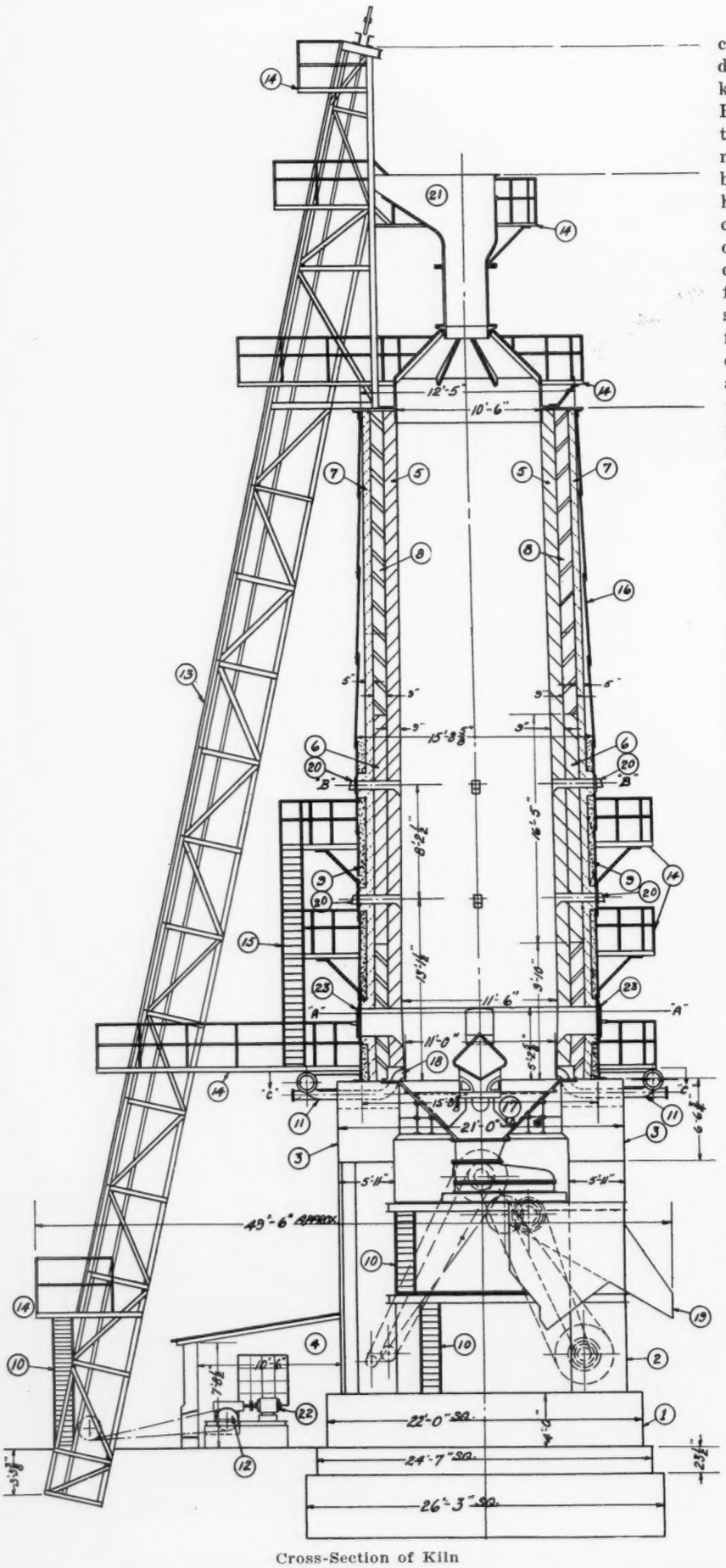
In construction the new excavator is on a par with all Haiss products. The entire machine is designed proportionately to the strength required at the digging end and it is built of materials proven best through actual experience.

Haiss Bucket Improvements

To improve the digging ability and service the George Haiss Manufacturing Company has redesigned each type of bucket. The sheave bushings are larger in diameter and there is a corresponding increase in the size of the sheave pins. The sheaves have also been better allocated, with respect to the closing rope. A new electric steel head casting eliminates all wobble. Wedge and socket cable connectors are also provided in place of the old style cable slips. Four way rope guides give positive alignment of rope and sheave. Another important feature is the integral bowl bracing and external arm brackets. Haiss now builds buckets with an electric steel bowl bracing which braces the back, corners and sides of the bowl. Integral with this casting are the two brackets for the connecting rods. These brackets extend beyond the back of the bowl and greatly increase the leverage and closing power of the buckets. Large pins at these bracket joints insure long wear.

A 1928 Model Heavy Duty Bucket

An Improved Loader Battling Aggregates



Cross-Section of Kiln

New System for Burning Lime

Economy of labor and high efficiency are characteristics of a recent development in the lime industry known as the "Sobek System for Lime Burning." The system includes all the necessary equipment for the manufacture of lime, i. e., storage bunkers for fuel and stone, kiln, skip hoist for raising charge to top of kiln, charging apparatus for securing even distribution of the charge in the kiln, drawing mechanism which provides for continuous drawing of lime, screen for separating lumps from the fines and ashes, and conveyors for delivering burned lime to cars or storage. The blower or exhauster, depending on the kind of draft, and all piping and transmission machinery, exclusive of motor power, are also a part of the system. The heart of the system is the kiln, but the other features are almost as important and the inventor wisely specifies that they must be included if maximum efficiency is to be secured.

The Sobek System has several new features of design, chief of which are the arrangements for feeding the stone and fuel and discharging the lime from the kiln. Both these operations are continuous and are a radical departure from American practice. These charging and discharging mechanisms are covered by patents owned by Mr. Sobek. This continuous charging and drawing process is very similar to that of the rotary kiln but without the high operating expense and high radiation losses. The movement of the stone and fuel is constant, but much slower than that of a rotary kiln, thus allowing time for burning pieces of stone as large as are handled in an ordinary shaft kiln. Part of the air used for combustion is drawn through the discharging apparatus, permitting the lime to be drawn at low temperature and eliminating the coolor usually necessary with a rotary kiln.

The kiln is an upright steel shaft with fire brick lining similar to those used in the United States. The fuel and stone are fed into the top and the lime withdrawn at the bottom, just as is the practice here. The differences consist in the methods of feed, control and discharge. The feeding is accomplished by means of a skip hoist, in a manner similar to that used in blast furnace practice. The patented charging apparatus, however, secures a better distribution of the stone and fuel than has been possible heretofore. This results in a more evenly burned product of uniform quality. Provision can be made for securing combustion by means of

natural, induced or forced draft, with coal or coke as fuel. The Sobek system also provides for the use of lignite or other fuels of low calorific value, as well as for the use of producer gas. Practically perfect control of combustion is secured by the provision of access and peep hole doors at several levels. The discharging apparatus, also covered by patent, provides for continuous discharge of lime and is also furnished with a screening arrangement for separating the lumps from the fines and ashes.

Owing to the excellent results secured, Mr. Sobek has designated his kiln by the title "High Efficiency Lime Kiln." Using coke as fuel, the average fuel ratio has been found to be from 5½ to 6:1, which is certainly high enough to justify the above title. This name is also deserved by the small amount of attention required by the system. One man to operate the skip hoist, and another to supervise the burning and drawing are all that are needed, whether the production be 25 tons or 100 tons per day. From this it may readily be seen that the operation of hoist and the distribution of the fuel and stone in the kiln are entirely automatic, being accomplished by means of the patented charging apparatus referred to above. The same automatic operation is a feature of the discharging mechanism, occasional supervision and adjustment being all that is required.

That the manufacturers and users of lime burning equipment are awake to the possibilities of the Sobek System is evidenced by the facts that the McGann Manufacturing Company, Inc., of York, Pennsylvania, have secured the American rights to build and market the equipment, and that Mr. Sobek has received several inquiries from various sections of the United States as to prices, etc., of his system. One of these inquiries was from the Allwood Lime Company of Manitowoc, Wisconsin, which company sent a representative to Austria to see the Sobek system in operation. He found all the claims made for it to be entirely justified by the results obtained, and it is extremely likely that the first Sobek kiln to be built in this country will be erected at their plant in the near future.

The Sobek kiln is at present made in four sizes, ranging from 10 to 16 feet in diameter, and from 60 to 90 feet in height. The smallest has a capacity of 20 tons of lime per day, while the largest has a capacity of 100 tons per day. The system is not limited to 100 tons as a maximum, this being merely the largest size built up to the present time.

The advantages of the Sobek kiln may be summarized as follows:

1. Simplicity of construction and small space required for kilns, thus reduced initial building costs.
2. The resulting lime is discharged in large pieces with the least possible breakage and formation of dust.
3. High yield and large capacity.
4. Saving of fuel.
5. Minimum amount of labor required for operation and manipulation, independently of output.
6. Few movable parts, thus saving of power and wear and tear of machinery.
7. The burning limestone is always in motion thus preventing overheating and premature destruction of the brickwork lining of the shaft.
8. Possibilities of reconstructing existing old kilns in accordance with the Sobek system.
9. Possibilities of burning either fine or coarse limestone, from nut size up to pieces one foot cube.
10. Low working costs per ton lime produced.

Gas Electric Locomotive

Industrial locomotives for a great many years were steam with special designs for handling very heavy loads on sharp curves and stiff grades, these special designs being geared down to a very low speed.

Steam locomotives have been largely superseded by electric locomotives and by gasoline or Diesel locomotives.

The trouble with the electric locomotive is that in 9 cases out of 10 only alternating current is available. When the motors are operating at sufficient speed, it is possible to use the entire current available but when the speed of the motors has to be reduced, it is necessary to make use of only a part of the current, the balance being expended in banks of resistance grids where it is turned into heat and accomplishes no useful purpose.

We, therefore, have the situation on the usual electrical locomotive of being able to use the maximum current only at full speed whereas the maximum current should be available for use at slow or stalling speeds.

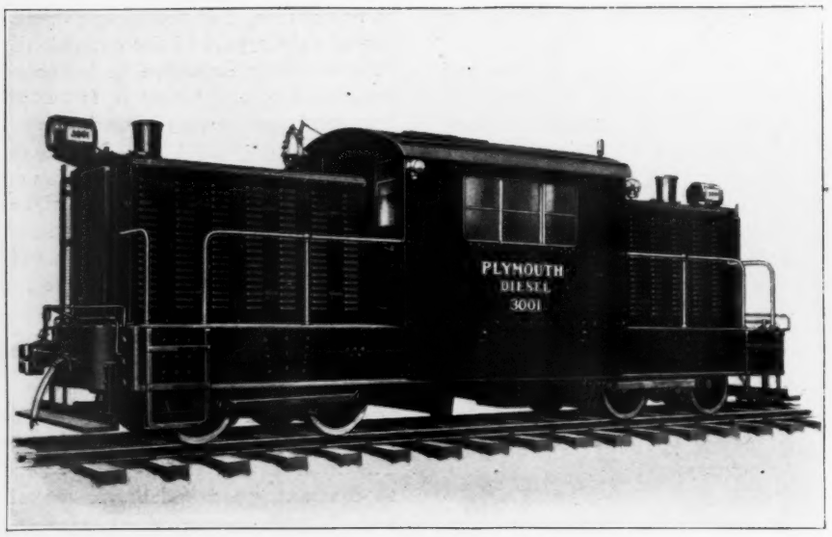
One way to avoid this condition is to install an alternating current motor, driving a direct current generator which is in circuit with a direct current motor, driving the locomotive. The alternating current motor runs at constant speed and drives the direct current generator at constant speed, the alternating current motor using whatever current the direct current generator requires.

The speed control is by varying the voltage in the direct current circuit. Lowering the voltage decreases the speed and increases the amperage and, therefore, the torque and vice versa. It will thus be seen that torque is maximum at the stalling point.

The above arrangement, commonly known as the Ward-Leonard System, is being used on large excavating machines but has not up to this time been used on electric locomotives because of the expense and the space available.

The H. K. Porter Company last summer placed in service at a large excavating operation at Wilmington, Illinois, a 40 ton nominal weight gasoline electric locomotive, equipped with a unique, simple and exceptionally rugged electric generating and controlling device. This locomotive was so successful that a duplicate was ordered by the customer. The power plant consists of two independent gasoline engines, each driving its own generator. The locomotive is mounted

Gas-Electric Locomotive and Train



A Diesel Powered Locomotive

on two 4-wheel trucks, each of short, carefully equalized wheel base, insuring that all wheels hug the rails at all times, and also allowing exceptionally short turning radius.

The generating equipment is not of the automotive or bus type, but consists of a relatively slow speed generating unit governed at 1200 r.p.m., whose output is entirely controlled by the speed of the gas engines, which speed in turn is controlled simultaneously from a single control handle, which also automatically places the driving motors in series or parallel as the momentary service demands.

Each of the four axles is driven by its own motor through single reduction spur gearing. These motors are 77 h.p. each, the maximum speed 480 r.p.m. which gives a locomotive speed of 25 miles per hour. In service the locomotive operates at a maximum of 12 to 15 miles per hour ordinarily.

Either one of the two gasoline engines can be operated separately when service does not require the full tractive effort obtained by the use of both and the electrical connections can be varied so that either generator may furnish power to one or both trucks in case of one gasoline engine only being operated.

The particular locomotive described is forty tons in weight. Where Diesel engines are preferred, they may be installed in place of the gasoline engines and the small high speed Diesels recently perfected are available for this purpose. The engine power on this locomotive is 320 horse power. Reversal of the engine is accomplished when the controller is in the "off" position by a simple reverse handle of the conventional street car type found on the controller, which is interlocked with the control to prevent reversal of the motors when the power is on.

The controller equipment consists of the master controller of the drum type, which controls the two gasoline engine throttles and also makes the necessary electrical connections for the driving motors beneath, giving a series or parallel operation of these motors with proper gasoline engine speeds as desired by the operator or demanded by the service conditions at the moment.

This locomotive is rated at approximately 22,000 pounds tractive effort with a factor of adhesion of 4, although in actual practice the tractive force approaches 30,000 pounds. The locomotive illustrated is the 30 ton gasoline electric. The advantages claimed for the locomotive, among others, are that the maximum tractive effort is available in starting the train, which is the time when it is most needed. There is also an entire absence of mechanical drive, the drive to each axle being independent of the other drives and connected to the frame of the locomotive by flexible electric connections. The gasoline engine is cushioned against driving shock because it drives the electric generator instead of a clutch and gear transmission. There are no friction clutches, no trolley, or third rail or storage battery applications where circuit and main fuses are required, as the electric generating equipment is designed in conjunction with the motor equipment, so that it can furnish power only within the proper rating of the driving motors, thus avoiding power surges experienced with other forms of electric locomotives.

Diesel Direct Gear Drive Locomotives

A Diesel locomotive has recently been brought out by the Fate-Root-Heath Company, manufacturers of the Plymouth locomotive. In this engine instead of the customary gasoline engine, a Diesel engine is used.

The illustration is of a 60 ton locomotive which is equipped with a Winton Diesel engine with 8 cylinders, 8½ inch bore and 12 inch stroke, airless injection, developing 400 horse power at 700 revolutions per minute.

The transmission provides for four speeds forward and reverse with jaw type clutches, the engine driving the axles directly through gearing.

The standard speeds are 3, 6, 12 and 24 miles per hour or special speeds may be had of 4½, 9, 18 and 36 miles per hour. At standard speeds in low gear, the tractive force is 37,188 pounds. For the special speeds in low gear, 24,792 pounds. In a recent test comparing the Diesel locomotive with an oil burning steam locomotive of about the same weight, the Diesel consumed 80½ gallons of oil in 13 hours continuous service in comparison with over 1,000 gallons for the steam locomotive doing the same work in the same length of time.

As this locomotive is mounted on two trucks, it will negotiate sharp curves and rough track.

These Diesel locomotives are now

The New Gas Electric Locomotive

available in sizes from 10 to 60 tons.

One axle of the two trucks is driven by the engine, the other axle of each truck being driven through connecting rods.

Palmer-Bee Improves Speed Reducers

The Palmer-Bee Company has just placed on the market an entirely new line of herringbone speed reducers. This series has been added in order to meet the ever increasing demand for still stronger, more modern and efficient enclosed gear reduction units.

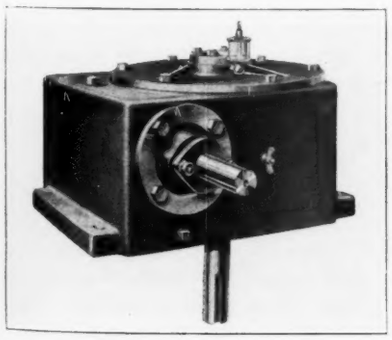
Anti-friction bearings are used throughout; ball bearings on the high speed, Hyatts on the intermediate and Timkens on the slow speed shaft. Gears are continuous tooth herringbone, with silent Kysor tooth form, producing more rolling and less sliding action than heretofore has been obtainable in these speed reducers. The slow speed gears in the double and triple series are divided in the center, permitting a more symmetrical arrangement of the gearing and a uniform load on each bearing.

Following the universal practice of the automotive industry in using the three point method of mounting motors in chassis, the Palmer-Bee Company has adopted this method in bolting the reducer to the sub-base. Alignment of the various elements of the drive are thus facilitated.

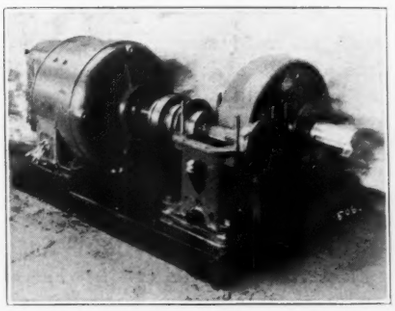
No outboard bearings are required for overhung loads up to the maximum rated capacity of the reducer. This feature is one of no little importance when the additional expense and inconvenience of including them in certain drive layouts is considered. The efficiency of the single series reducers is approximately 99 per cent, and of the double series about 97 per cent. An illustrated folder describing the salient features can be obtained from the manufacturer.

James Announces Improved Heavy Duty Speed Reducer

The D. O. James Manufacturing Company announces an improved



A James Speed Reducer



Farrel-Birmingham Type

vertical type heavy duty worm gear speed reducer that is made to allow for vertical driving with the drive shaft projecting at either top or bottom.

The housing is of high grade gray iron, of ample size, provided with a large oil cooling and heat radiating chamber. Timken Bearings support both sides of the gear shaft, and make for smooth operation. The worm shaft is mounted on Double Timken Bearings on one side and Norma Hoffman roller bearings on the other.

Gear shafts are .40 carbon steel, carefully ground to size, and made oversize to withstand emergency strains and starting loads. Worms are made integral with worm shafts of S. A. E. 3140 chrome nickel steel, generated, heat treated, ground and fully relieved. Gears are made of high-grade phosphor bronze, the larger sizes made up of a bronze ring, shrunk on and keyed to a cast iron spider.

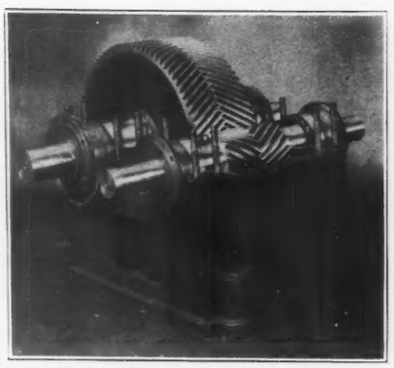
Twenty degree to thirty degree pressure angle teeth are standard, depending on the number of teeth in the worm and gear, and all gears are made with amply wide faces.

This speed reducer applies particularly well on drives for mixers, agitators, disc feeders and other equipments that rotate on a vertical axis. The expense and delivery delay of vertical type motors are entirely eliminated by using a vertical type unit where conditions warrant such a drive.

Farrel-Birmingham Announce Improvements

A new and complete series of speed reducers which have Sykes continuous tooth herringbone gears and antifriction bearings is announced by the Farrel-Birmingham Company of Buffalo, New York. The improvements claimed for this design of units are:

The roller bearings being of the type which combine journal and thrust capacity, both pinion and gear shafts are held from end float and are therefore protected from abuse from connected mechanism.



Another 1928 Development

It points out that this type of mounting is practicable with the Sykes gear since the apicis of the teeth are central in the face of the gears around their entire periphery, and no end float of either gear or pinion is necessary.

The mechanical efficiency is increased to between 98½ to 99 per cent for a single reduction and from 98 to 98½ per cent for a double reduction.

The lubrication is simpler than with the plain bearing units since in all cases the same oil may be used for gears and bearings and the splash and flood automatic system of lubrication is possible throughout the whole series.

There is claimed to be a considerable saving in space with these speed reducers.

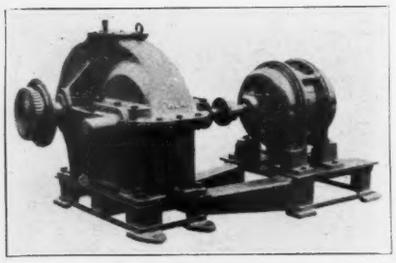
The roller bearings being interchangeable, it is possible to make the gear units interchangeable and to manufacture them in larger quantities than the plain bearing type units, thereby reducing the initial cost.

The Farrel-Birmingham Company has just published a new booklet describing this series of units and giving charts containing horsepower capacities, general data on Sykes gears and illustrations showing their applications.

Refinements and Additions To Falk Speed Reducers

After a series of exhaustive tests, the Falk Corporation has added certain refinements to its line of standard speed reducers which are the culmination of the experiments and research work carried on during the last few years.

Several new sizes have been added which include four new single reduction units, three double reduction and three triple reduction units, plus nine sizes of single reduction units with vertical centers now making a total of 48 different sizes in all. The program of standardization which was started in 1925 has reached a point



Another New 1928 Model

where even the ratios have been included. Now every reducer of a given type has the same series of standard ratios from the smallest to the largest unit. For example, the smallest single reduction unit—1HA—has the same uniform series of ratios as the 13HA which is the largest single reduction unit. This, along with simplified rating tables, has made the selection of Falk speed reducers very simple.

A complete line of welded steel motor beds has been added which means that each unit can be had with a welded steel or a cast iron motor bed. When a speed reducer is mounted on timbers, structural steel or any other foundation other than concrete, there is some advantage in using welded steel motor beds because of the greater strength. A double reduction unit mounted on a welded motor bed is shown in the illustration.

The specifications of the low speed shafts have been changed from .50 to .60 carbon steel to alloy steel which makes possible the heavy shock loads and sprocket pulls which speed reducers are sometimes subjected to. In a finished product, there must exist a balance of design of one part to another but care must be taken also to protect those parts which will be subjected to the peak loads and shocks first. In many cases, the low speed shaft is the first member to receive the peaks and the shocks so that strengthening the low speed shaft by using alloy steel increases the capacity of the reducer for fluctuating loads. The element of risk is thus eliminated and assurance of continuous service is provided.

Another improvement of considerable note is the new method of forging pinions. They are not machined from ordinary bar stock but are made of heat treated chrome vanadium steel by the upset forging process. This method of manufacture produces greater strength and toughness as the fibres of the steel are continuous, a condition which does not exist when pinions are forged in the ordinary manner. The smaller gears are made of drop forgings while the larger ones are made of "Telastic" steel—a special gear material developed and made by Falk after years of study.

Through bolts, made of heat treated steel are used throughout the entire line of Falk standard speed reducers. Although studs and capscrews of ordinary machine steel are commonly used, it is good economy to use a material more in keeping with the specifications of other parts of the reducers. Oil tight joints are assured when through bolts are used, and, if necessary, the cover can be removed and put on again with considerable ease.

Falk airplane type sleeve bearings remain unchanged. During the tests conducted recently, in which several reducers were loaded to the breaking down point, gear teeth were destroyed and alloy steel shafts were twisted but the bearings stood up under the load. This type of bearing has been used on Falk reducers for the last three years and although thousands are in service, none have ever worn out or have needed replacement. In fact, the success of this bearing in practically every conceivable field of industry has been such that its development has been extended to heavy rolling mill units. The babbitt is applied to the bearing shells by a special process. The combination of the various actions caused the babbitt to adhere so firmly to the shell that the shell and its babbitt lining become united inseparably into one mechanical unit. This, briefly, accounts for the success of this type of bearing in all classes of industry.

A new lubrication plate attached to the base of the gear case gives instructions as to the proper grade of oil to be used under every conceivable operating temperature and condition. These recommendations are based on recent tests performed under actual operating conditions with various oils of different manufacturers.

Traylor Engineering Develops Speed Reducer

A detail of kiln, cooler and dryer design to have the attention of Traylor engineers was the drive which until recently has consisted of several pairs of out gears to secure the required reduction from motor speed. To eliminate this waste, the Traylor speed reducer was designed and built.

The case, or housing, is made of close grained cast iron, the motor base cast integral and is fitted with a heavy cast iron cover for the gear chamber, same being securely dust tight and oil-tight. The housing is bolted to heavy longitudinal H beams which are intended for imbedding in the concrete of the foundation, and heavy set screws are provided at each end for adjusting the position of the

A Special Purpose Machine

reducer to exactly mesh the main pinion with the girth gear.

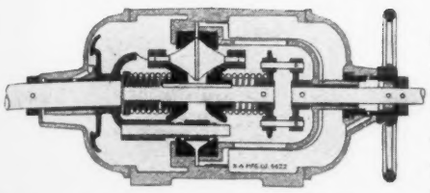
The housing or case contains the main driving pinion and three sets of reduction gears, all with cut teeth with the addenda of the pinion teeth increased slightly to lengthen the contact arc. All gears are made of .35-.45 carbon cast steel and all pinions are forged integral with the shafts of high strength alloy steel, heat treated.

All of the shafts are fitted with Timken bearings inserted through suitable openings in the sides of the housing, and a carefully designed and fabricated guard is provided for the main gear of the unit, as closely fitting the shell thereof as will permit operation without interference. At the points where this guard is attached to the housing dust tight and oil tight joints are made. The gears and the main pinion run in oil and the bearings are self lubricating, and the first shaft is extended outside the housing and fitted with a suitable flexible coupling for attachment of the motor.

The advantages of this reducer are apparent, for not only is the primary object attained but original alignment is greatly facilitated and it is maintained permanently, so that the whole unit may be slid away from engagement, to make the girth gear accessible and returned to proper position with no necessity of adjustment except horizontally. The illustration shows one of the larger of these speed reducers. It is built in several sizes to meet varying horsepower requirements.

A New Speed Reducer

The JFS Variable Speed Transmission, a new speed reducer, which permits minute variations of speed over a wide range, is being manufactured by the Stephens-Adamson Manufacturing Company. The ingenious application of an entirely new principle



Sectional View of Speed Transmission

has resulted in this variable speed reducer which operates quietly, efficiently and without vibration. Described simply, roller bearings submerged in oil transmit power at varying speeds.

The high speed shaft is direct connected to an electric motor while the slow or variable speed shaft delivers direct to stokers, conveyors, machine tools, paper machinery, or, in fact, any machine where it is desirable to regulate the operating speed.

Power is transmitted by means of traction between polished steel rollers and races of special shapes. Speeds are varied by changing the relative positions of the races. This output speed variation is regulated by simply turning a small hand wheel and the increase or decrease is accomplished while the machine is at rest or in motion.

The mechanism is totally enclosed and operates in a constant bath of oil. The whole unit occupies very little more space than the electric motor, to which it is attached and because it operates without gears is very quiet.

A New Track Shifter

The Nordberg Manufacturing Company has recently developed its Model O track shifter. The basic principle of operation is similar to the Model N which was designed for standard gage track. Due to a less severe service, the experience gained from the older model and an ever broadening field of application, some changes in arrangement and construction of details have been made in the new machine, making it especially applicable to narrow gage tracks.

A New Narrow Gage Track Shifter

Quarries, open pits, gravel plants and other operations that have narrow gage track to shift or raise on waste dumps, fills, moving loading tracks up to shovels and similar jobs will find this machine efficient. The machine is of rugged sturdy construction, built to withstand the service commonly found on track work.

Timken Bearings For Kilns

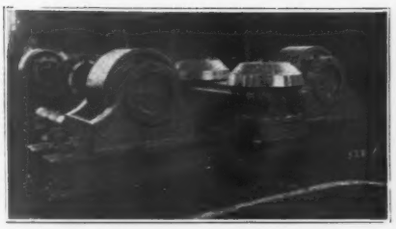
A year or so ago the Traylor Engineering and Manufacturing Company took the lead in substituting support rollers of the single roll type for rotary kilns, coolers and dryers for the older and more troublesome cradle design, an innovation which was received because the single roller support effectively disposed of all guesswork relating to the alignment of the unit and eliminated all concern as to the maintenance of same.

The shaft bearings were still subject to wear and therefore the roller shaft was eliminated by extending the roller hubs to form stubs and the bearing was redesigned in order to employ Timken bearings which are mounted directly on the stubs of the roller hubs.

The outer race of the Timken bearings is held in proper position by means of an adapter carefully machined and bolted to the pedestal bearing and the adapter is fitted with an inside cover and packed to render dust proof and oil tight. Alemite lubrication is the standard but the pedestal is designed with an oil chamber so that the Timken bearings may be operated in oil.

The two pedestals forming a set are mounted on a heavy frame made of steel girders securely tied together with suitable channels and an I beam, the pedestals being planed on the bottom and the frame on top for accurate fit and alignment. Heavy set screws are provided for adjustment purposes and to take the outward thrust of the bearings, same being mounted in removable plugs so that the pedestals may be withdrawn from under the unit when desired.

The illustration shows the thrust roller set. In that case, the thrust rollers are made conical to operate at all times without slippage. The shaft is integral with the roller and is provided with a thrust button on the bottom. The roller brackets are bronze bushed, clamped together and bolted to the sole plate mounted on the roller frame. The roller brackets are adjustable laterally and vertically and may be quickly removed without trouble.



Timken Equipped Kiln

Unique Bearing Design For Dusty Installations

Announcement of a new type of ball bearing housing design, is made by the Universal Vibrating Screen Company. A combination of pure wool felt and labyrinth seals in these new ball bearing housings, makes it impossible for dust to enter bearing, regardless of operating conditions, according to the manufacturers. The new improved and thoroughly tested design, is now standard equipment on all sizes of screens made by that company.

High Speed Diesel Engines

A range of sizes of high speed engines has been brought out by Fairbanks Morse and Company, all operating at 800 revolutions per minute and with 2, 3, 4 and 6 cylinders rated at 15 horse power per cylinder.

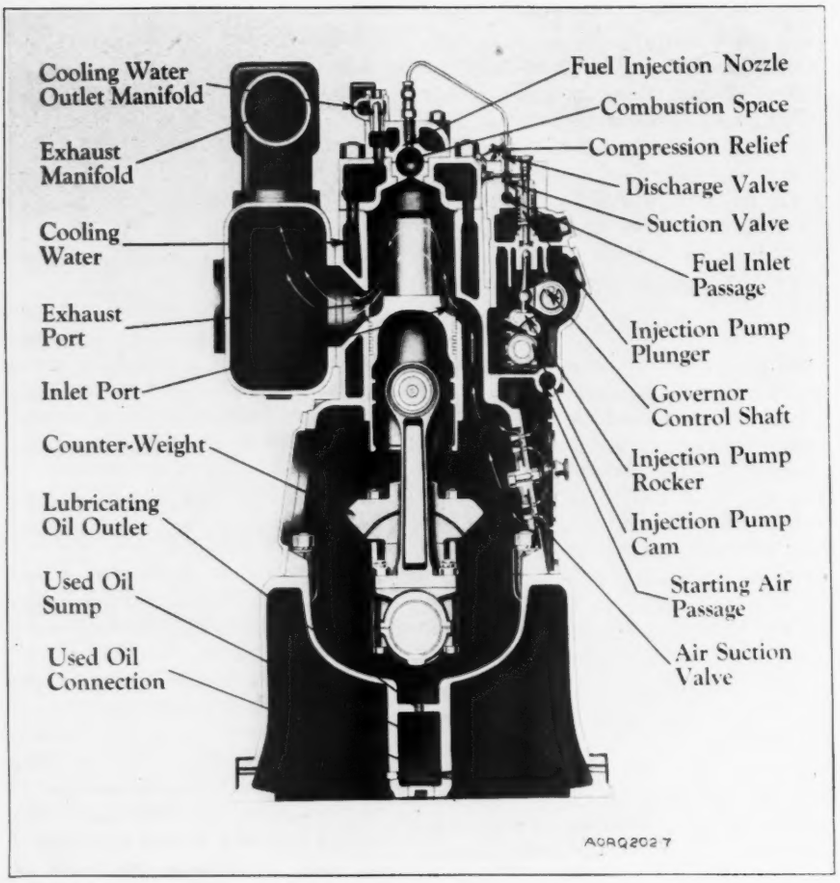
These engines have been brought out during the past year. They operate on the 2-cycle principle of operation of airless injection of fuel, thus providing engines of greatest simplicity and eliminating inlet and exhaust valves with their necessary rock arms, push rods, timing gears, lay shafts and cams.

Starting is accomplished by compressed air, this starting air being supplied either by a compressor built into the engine or by a separate small engine-driven compressor.

Engine speeds ranging from normal to one-half that amount are obtained by a slight adjustment of governor control.

If more rapid changes in speed are desired than are obtainable from governor control, a quick acting speed-changing device is also provided.

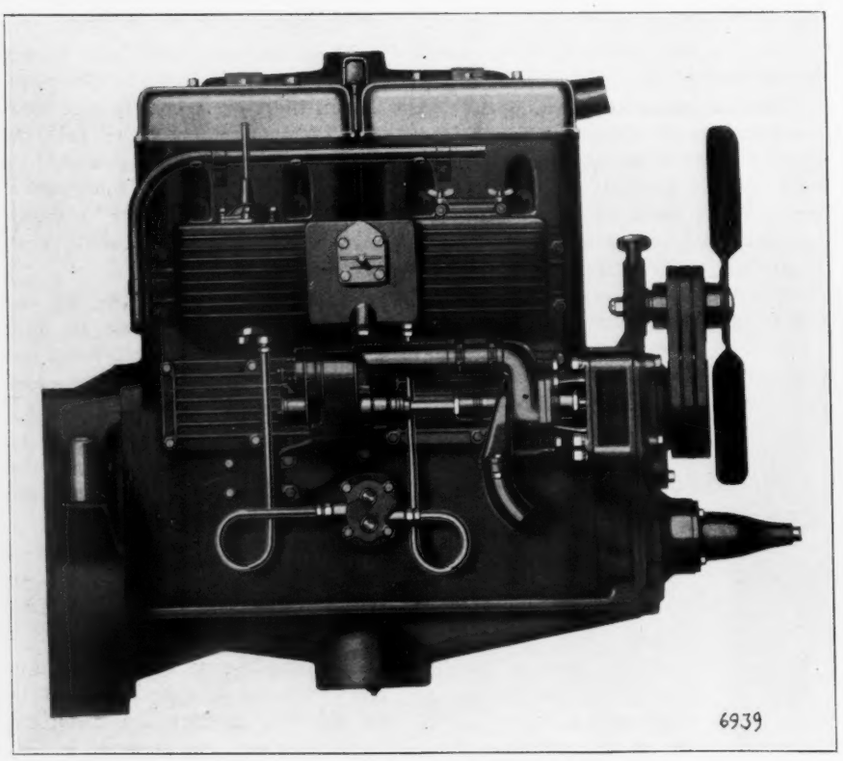
The general construction of the engines is shown by a cross section, the air entering through the crank case being slightly compressed by the down stroke of the piston so that



when the piston uncovers inlet and exhaust ports a scavaging blast of air blows through the cylinder and clears it of the exhaust gases. A combustion space is connected to the cylinder space by a small opening, the fuel being introduced into the combustion spaces.

The side view of the 6 cylinder engine is also shown with the air inlet filters in place.

This is the only high speed 2-cycle



A 1928 Development

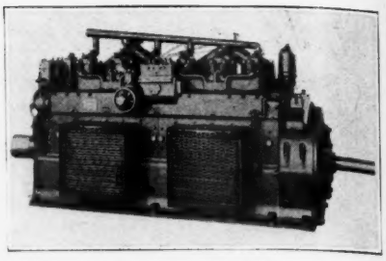


Diagram at Left

Diesel engine available at the present time in any size. It makes possible a direct connection of this engine to various types of equipment which have been designed to operate on electric motor speeds.

It is very compact and does not occupy spaces greatly in excess of the corresponding heavy duty gasoline engine.

Continental Announces New Type Engines

A complete new line of four-cylinder, 6½ and 7 1-3-inch stroke industrial engines of the slow speed type, designed especially for continuous and dependable heavy duty, has just been put into production by Continental Motors Corporation at the Muskegon plant. The new models, eight in number, will be known as H21 to H28, inclusive.

According to Continental engineers, these engines are marked by unusual ability under heavy loads, together with extreme durability, economy and accessibility. In the design have been incorporated such engineering refinements as removable cylinder sleeves, overhead valves, large crankshafts with five main bearings, dry sump oiling system, built-in governor, and longer and better proportional pistons, all of which increase motor life and permit many more working hours at minimum expense.

General specifications for the new series indicate the ruggedness and practicability of the design.

The engine is of the four-cylinder, vertical, valve-in-head type. Cylinder bores in the eight engine sizes are 5, 5¼, 5½, 5¾, 6, 6¼, 6½ and 6¾ inches. Piston stroke in the four smaller sizes is 6½ inches, and in the larger, 7½ inches. Horsepower ranges from 39 in the smallest engines of the series to 125 in the largest. Recommended governed speed is 1,000 r.p.m.

The removable sleeve cylinders are made of hard nickel iron. Cylinder heads are also of nickel iron, cast in pairs. The nickel iron pistons have three compression rings 3-16 inch wide, and one oil control ring ¼ inch

wide, all four above the wrist pin, which floats in the piston and is held endwise by snap rings.

The crankcase is of gray iron, cast integrally with the cylinder water jacket. The flywheel housing is a separate unit, bolted to the crankcase. The flywheel is of semi-steel, machined to take a twin-disc, single plate clutch. Five bronze-backed babbitt, shim adjusted main bearings are provided for the crankshaft, which is drop forged steel, dynamically balanced, and supported in cantilever type bearing caps. Front extension for power transmission is supplied on special order. Connecting rods are of drop forged steel, rifle drilled for wrist pin lubrication. Removable phosphor bronze bushings are provided in the connecting rod upper ends, and spun babbitt in the lower ends. Both are shim adjusted. The starting crank has a revolving grip handle, and is self-contained in a starting crank housing bolted to the gear case cover.

Exhaust and intake manifolds are cast separate, with outlet turned up at center and threaded for 3-inch standard pipe. The camshaft, located on the right hand side, has five bronze backed babbitt bushings. The timing gear mechanism consists of three 1¾-inch wide, spiral cut, heat-treated alloy-steel gears. The exhaust valve is of silicon-chromium, and the intake of chrome nickel, with port diameters 2¼ inch, lift 7-16 inch, and angle of seat 45 degrees.

The water pump is of the gear-driven, centrifugal type, with water outlets over exhaust valves and ports. The fan has 24-inch diameter blades, with triple V-belt drive. Lubrication is by the dry sump system, with the oil reservoir high and accessible on the camshaft side, capacity being three gallons. The oil pump is of the two-stage, gear-driven type, giving pressure feed to all bearings at a normal pressure of 40 pounds. The oil filter and sediment basin form part of the main reservoir. Relief and regulating valve is on the end of the camshaft, accessible through the gear case cover.

Ignition is by high tension magneto, equipment including magneto switch, cables, cable-holder and set of 7/8-18 standard spark plugs. The governor is of the gear driven centrifugal type, located directly under the carburetor. The carburetor is of the vertical, 1¾ std., SAE flange, balanced type, located on the left side of the motor, opposite the camshaft. The air cleaner is of the filter type, with oil-wetted element. The motor is provided with three point support, the front trunion being cast integrally with the gear case cover.

Four and Six Cylinder Engines Added to the Climax Line

The Climax Engineering Company has added two new engines to its current line. Both of these have a bore of 6 inches and a stroke of 7 inches, developing in the four cylinder, Model R14, 100 and 110 bhp. at speeds of 1,000 and 1,200 rpm. respectively. The six cylinder, Model R16, which is of similar design also produces 150 and 165 bhp. at 1,000 and 1,200 rpm. respectively. Preparatory to bringing out these engines a very careful study was made of existing designs which, together with a great deal of research and laboratory work, resulted in the present construction.

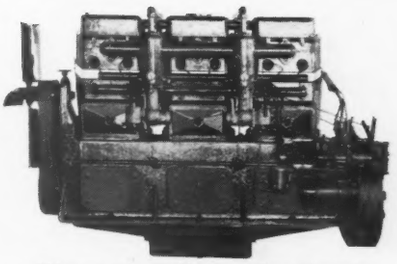
The results have been most satisfactory, furnishing an engine of high power, excellent economy, and flexibility and a remarkable freedom from detonation even when operated at low speeds and full throttle carrying mean effective pressures well in excess of 100 pounds per square inch.

This may be attributed to a combination of a number of essential and important details coordinated in their proper relationship. Among these may be mentioned the following: Careful attention is given to the water circulation, cooling of cylinders, combustion chamber, spark plugs and valves, the latter being smaller than is usual in engines of this size. The combustion chamber is scientifically designed to properly secure turbulence of the mixture, short flame travel and spark plugs placed in an effective location. The relation of valve timing to lift, manifolding, carburetion and port design all coordinate to give a performance that is unusual in an engine of this type.

Mean effective pressures of 100 pounds per square inch at 1,000 rpm. are secured on both the four and six cylinder models with fuel rates of less than .6 lbs. per bhp. hr. At reduced speeds the torque increases materially with remarkable stability, giving proper characteristics for crane, shovel and other industrial applications where steam engine performance has been the standard of comparison. By taking a slight reduction in power, fuel rates have been secured well under .55 lbs. indicating the efficiency of this design.

Buda Announces 6 Cylinder 180 h.p. Full Diesel

The Buda Company announce a new Buda-M.A.N. 6-Cylinder, 6½ by 8¾,



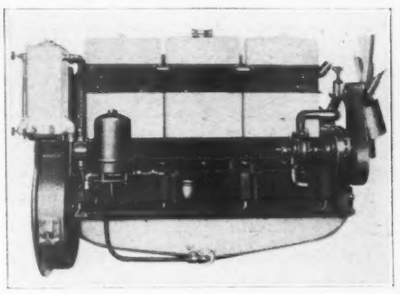
Climax Six Cylinder Blue Streak

180 h.p. high speed, light weight, full Diesel engine. Like the other Diesel engines manufactured by The Buda Company this model is closely related to designs of the M.A.N. Company of Germany, from whom The Buda Company is operating under license and patents. The actual weight of this engine with all equipment, except clutch, is approximately 5,400 pounds. The overall length is 89 inches and the height is 58 inches.

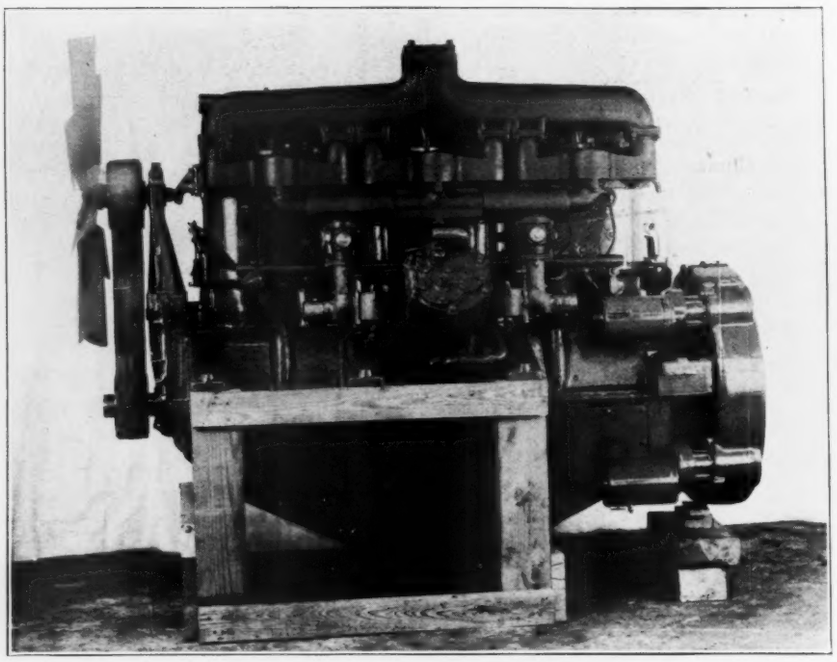
This engine is designed in accordance with the airless fuel injection principle. Compressed air is not used either for starting or running. The engine is started by means of a small air cooled, two cylinder engine mounted on a bracket which is cast on the flywheel housing. Electric starters can be furnished for starting instead of the two cylinder gasoline engine if so desired.

Standard equipment consists of fuel filters, lubricating oil filters, air filter, set of tools and starting equipment. Fuel consumption is very low per b.h.p. hour. Fuel having a Baume gravity of 26 to 38 can be used.

Several of these engines have already been delivered to manufacturers for use in industrial equipment. With their normal operating speed of 1,000 r.p.m. coupled with their compact proportions, open up many new fields that heretofore have been impracticable for Diesel engines. Electric generating units, locomotives, rail cars, dredges, compressors, shovels and many other forms of industrial applications can be handled by these Diesel engines.



Engine with a Different Principle



Air Compressor Built into the Machine

LeRoi Builds in Air Compressor

The most interesting machine brought out by the LeRoi Company during the past year is the building in of an air compressor, as an integral part of the large 6 cylinder engine.

This particular compressor, so far, has been attached only to the 170 hp. 6½ and 6¾ by 7 sizes, it has a capacity of 52 cubic feet per minute, and its purpose is in supplying air for air operated equipment, such as air brakes and clutches on whatever unit it may be installed.

One maker of gasoline shovels recently suggested that another use for this auxiliary compressor would be to drive jackhammers for small blast holes ahead of a shovel operating in stone.

It is true that with a fairly large air reservoir such a scheme is entirely feasible, and it may be that before long some shovel manufacturer will attempt to make such use of it.

This compressor is driven from the main crankshaft of the engine, through a connecting rod having its bearings between the No. 3 and No. 4 pins on the crank. At the present time this unit is being used by the Clyde Equipment Company on its hoists and by Fate-Root-Heath Company of Plymouth, Ohio, on its 25 ton locomotive. The company is planning to extend this application to other models, but so far have made only one other installation, of a similar character.

Centrifugal Pumps

The Morris Machine Works have been active in developing their pumps during the past twelve months, especially the slurry pumps and the medium duty and heavy duty lined dredging pumps.

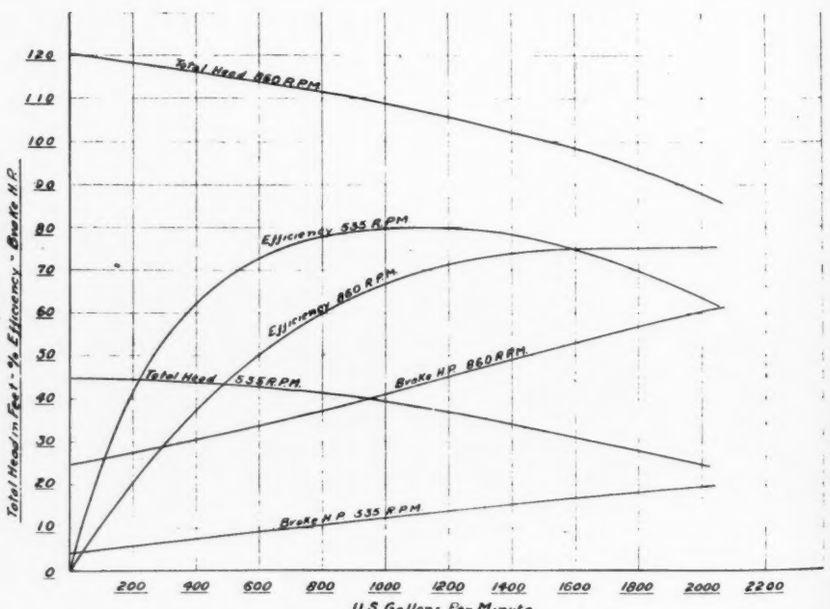
The slurry pumps are designed for handling slurry in cement mills, grinding sand in glass plants and abrasive mixtures. These pumps are built in four sizes, 2 inch, 3 inch, 4 inch and 6 inch. They are made with ball bearings throughout, with large suction intake and with an adjustable sealing ring around the suction. They are of very rugged construction and are designed for high efficiency and low upkeep cost.

The medium duty dredging pumps are for general dredging service where the total head does not exceed 100 ft. These pumps are built in six sizes, 4 inch, 6 inch, 8 inch, 10 inch, 12 inch and 15 inch and meet a long felt want for a high grade dredging pump for medium conditions.

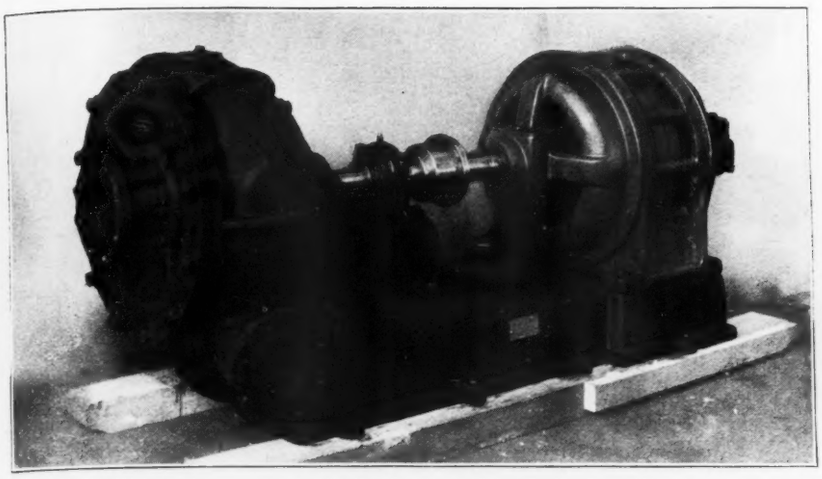
They are made with adjustable sealing ring at the suction intake with a cutless rubber bearing and sealing ring in the hub and with ball thrust and radial bearings outside of the pump. The illustration shows a 6 inch pump of this type directly connected to an electric motor. The 4 inch and 6 inch pumps are made with overhung shell while pumps 8 inch and above are made with the shell supported on a sub base.

The heavy duty pumps are lined throughout and designed for general dredging service for total heads up to 150 ft. This pump is built in 5 sizes, 6 inch, 8 inch, 10 inch, 12 inch and 15 inch, with an adjustable sealing ring on the suction, a cutless rubber bearing in the hub and ball thrust and radial bearings outside the pump. The wearing parts can be renewed readily without disturbing the alignment of the pump or the bearings.

The principal improvements in these pumps have been along the lines of increased efficiency and the results obtained from tests show that nearly the same efficiency can be obtained from properly designed slurry and dredging pumps as is obtainable with centrifugal water pumps of the best modern design. The performance



Performance on Test of 6" Morris Medium Duty Dredge Pump Fig 3



An Improved Pump

curves illustrated are for a 6 inch medium duty dredging pump. It will be noted that the efficiency at 1,100 gallons per minute is 80 per cent at 535 rpm., and that the efficiency for 2,000 gallons per minute is 75 per cent at 860 rpm.

All of the heavy duty dredging pumps can be supplied with wearing parts of semi-steel, carbon steel or manganese steel, depending upon the service for which the pump is intended.

For pumping coarse gravel, the manganese steel wearing parts would be recommended. For lighter materials, such as sand, a pump with carbon steel or alloy steel would be best, while for pumping materials which were not abrasive, pumps with semi-steel wearing parts can be used to advantage.

Improved Belt Conveyor Carrier

An improved type of end bracket has been designed by Stephens-Adamson engineers for the Sacon carrier. As shown in the illustration, this new outer support bracket fits close to pulley end and prevents any chance for lumps to wedge between pulley and bracket. This new design also furnishes additional protection for the end bearings which are so likely to be exposed to moisture, dust and grit. Sacon carriers are made with either ball or roller bearings mounted in dust-tight, self-aligning housings, and the improved end stands are standard for all sizes from 24 to 48 inch belts.

Sacon Belt Carrier

A New 3-Way Dump Trailer

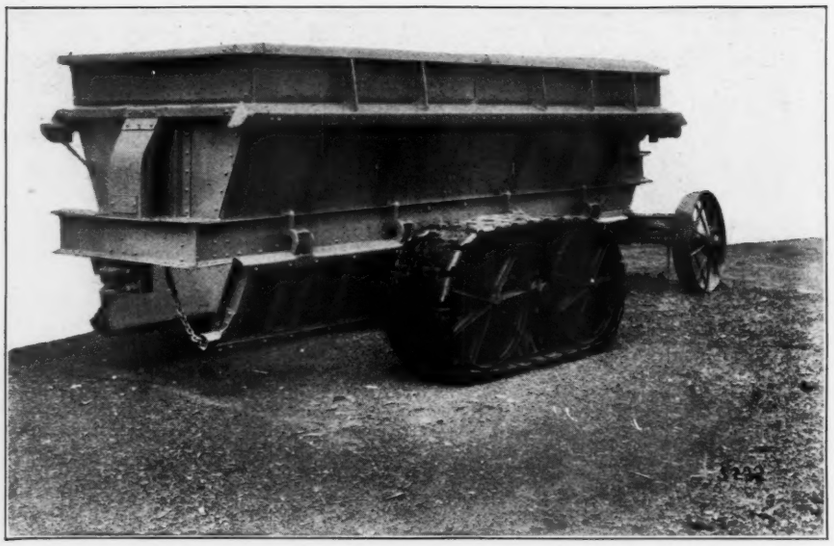
Introduced during the past twelve months, the Athey Truss Wheel 3-way dump trailers have brought to the transportation field three novel features. First, the amount of material handled in a single trailer, second, the fact that it dumps on either side or to the rear at will, and third, the peculiar form of truss tread used.

These machines are built so that by simply moving a lever on the trailer, it can dump to one side or the other or to the rear.

They are built in two sizes, the smaller one with a capacity 4 to 5 cubic yards and adapted for use with a "Caterpillar Thirty." The side gates open down and are wide open when the body has reached an angle of 16 degrees. The side dump angle is 52 degrees and the rear dumping angle is 60 degrees. The dumping is controlled by a double cylinder commercial hoist with a stroke of 34 inches. A special hydraulic pump with power take off is fitted on the rear of the caterpillar thirty, the pump being connected to the trailer by a detachable metallic hose. The loading height is 62 inches and the wheel base is 10 ft. 2 inches. The area of tread on the ground is 9 square feet and the weight of the trailer and load is approximately 24,000 lbs., so that the weight per square foot is about 2,670 pounds.

The truck is supported on four metal wheels, two on each side, over which runs an endless tread which is of a special trussed form and the tread and the axles of the wheels are so designed as to minimize the friction and offer as little resistance as possible to the traction which is supplied through the drawbar by the tractor. The wheels simply turn over as the truck is pulled forward, no power being applied to them. The usual working traveling speed is 3.9 miles per hour, which is the high speed of the tractor and this speed is used both for the loaded part of the trip and the empty part of the trip. The tractor operator operates the tractor and the trailer so that it is a one man outfit.

A Three Way Dump Body



A New Crawler Dump Wagon

The tractor, the trailer and the tractor operator form a working unit which is maintained continuously and if additional capacity is required, it is necessary to add another tractor, another trailer and another tractor operator.

Thus the ideal of earth moving is realized with a tractor operated by one man and mounted on caterpillar treads so that it is able to go almost anywhere, make sharp turns and occupy the minimum amount of space. This tractor pulls the trailer, also on caterpillar treads and able to go anywhere the tractor can, carrying the maximum load with the shortest possible wheel base, the best possible turning radius and the facility of dumping in any one of three directions, the whole thing operated by one man. It is the logical ideal toward which we have been moving over a long period of years with the slip scrapers, Fresnos, wheel scrapers, etc.

Of course, this unit does no digging but has to be loaded from an outside source, but the writer believes that the best possible solution of handling earth in the dry is with the use of a digging machine built for digging purposes only and supplemented by transportation units which are adapted to transportation only.

The only thing that has to be watched is that enough transportation units are used to keep the digging unit busy. It is very seldom that this condition is found on any job.

In considering the bearing pressure of the loaded trailer on the ground, it must be remembered that where the treads are simply rolling along the ground, with no traction being applied through them, that they can be loaded down much more than can the tread on a tractor which is moving ahead by manipulating its own tread.

It will be interesting to obtain from studies of several jobs using this equipment and get a comparison of the costs with costs where old types of equipment have been used.

The 4 yard trailer attached to a caterpillar thirty has a turning radius of 9 feet 6 inches.

The larger machine is exactly like the small one in design except that it is built heavier so as to carry a load of 7 to 8 cubic yards. This trailer has a loading height of 75 inches, a wheel base of 10 feet 2 inches, and a turning radius with a Caterpillar Sixty of 12 feet. The length over all is 136½ inches, which is the same as the smaller trailer, the height is 45 inches or 12 inches more than the small one, width 102 inches or 4 inches more than the small one and the depth of the body is 35 inches against 23 inches for the smaller. On this larger trailer the side dumping angle is 48 degrees and the rear dumping angle is 60 degrees.

The same traveling speed is used, namely 3.9 miles per hour, and one Caterpillar Sixty will handle two large trailers up a grade of 10 per cent under favorable circumstances. A large trailer weighs loaded about 32,000 pounds and as the bearing surface on the ground is 12 square feet, it gives a bearing pressure per square foot on the ground surface of about 2,670 pounds, which is just about the same as the small trailer. This means that the large trailer will engage as bad ground as the smaller one and that it has no greater overall length, so that it is simply a question of capacity and price which would determine the use of one rather than the other.

The trailers are arranged so that two or more may be connected as a train.

The doors and the gates open and close automatically so that the caterpillar operator never has to leave his seat. The trailer dumps clear so that it does not interfere with the truss wheels and it will also dump clear over the edge of the fill. The trailer may be backed into position for loading.

Crawler Dump Wagons

In addition to the 3-way dump trailer described above, heavy steel dump wagons on crawling treads are also available. The dump wagon manufactured by the Western Wheeled Scraper Co. is illustrated. This is a 10 yard wagon and is mounted on 15 ton capacity treads. The side sheets are 3/16 of an inch thick. This wagon is intended to be used with a power shovel, being too high to be loaded by an elevating grader.

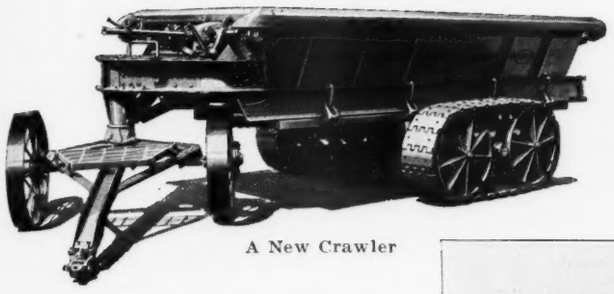
There are two sets of bottom dump doors, one in front and one in back of the axle. These are wound up by the operator by means of a ratchet attachment at the front. The two side doors drop simultaneously or the back doors can be dropped and raised independently of the front doors. The mechanism for controlling the dumping is all outside of the wagon out of the way of the discharge. The wheels have 12 square feet of ground contact. These wagons weigh about 12,200 pounds, occupy a total width of 9 ft. 1¾ inches and are 6 ft. 3 inches long. The length of body at the top is 14 ft. 3 inches.

A small size is built which has a capacity of 7 cubic yards. It is adaptable to loading by an elevating grader, the overall height being 5 ft. 3 inches.

Dump Cars

To meet the demand for low height dump cars in the 25 and 30 cubic yard capacity to facilitate loading in open pit mining, quarry work, railroad maintenance-of-way and general industrial service, an extremely rugged drop door air dump car has been developed by the Western Wheeled Scraper Company. It has been installed during the past year in large numbers on many operations and is giving satisfactory service.

The cross sills of the body of the car rest directly on the underframe draft sills and the body is supported also on 12 pivots or bearings, 6 on each side of the car, giving proper distribution of the load and a very low overall height. The bed cannot be tipped unless air is admitted to the



A New Crawler

Air Operated Dump Car

cylinders or some external force applied, which prevents any possibility of accidental dumping due to careless handling.

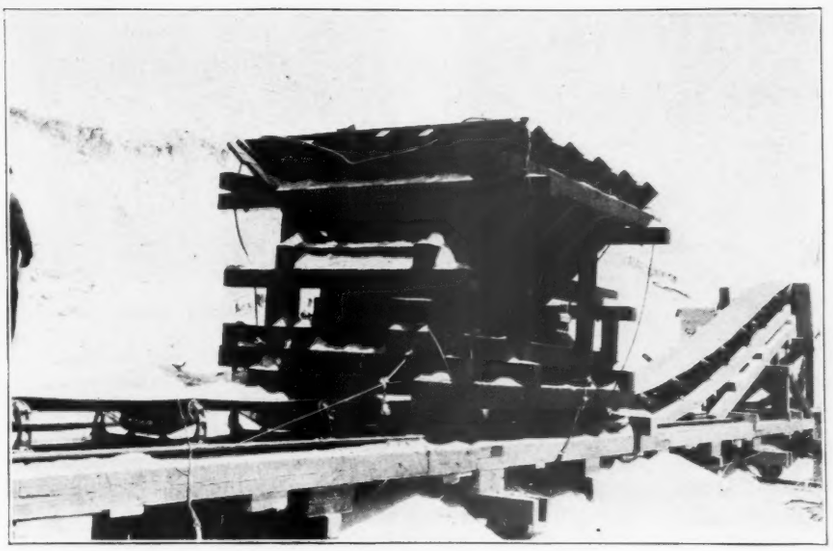
The use of dual side pivots on either side of the center line of the car, about which the bed rotates while dumping, results in a remarkably fast dumping car with relatively small air consumption.

The car can be tipped to either side at the will of the operator without adjustment or reversal of any mechanism. Single stroke cylinders operating at low air pressure give a dumping angle of over 50 degrees.

The mechanism that controls the down-turning doors is at each end of the car, are enclosed and protected. Wherever practicable, structural shapes, flat plates and bars are used in the construction of the car instead of flanged plates in order to simplify repairs and reduce maintenance costs to a minimum.

Belt Conveyor For Field Use

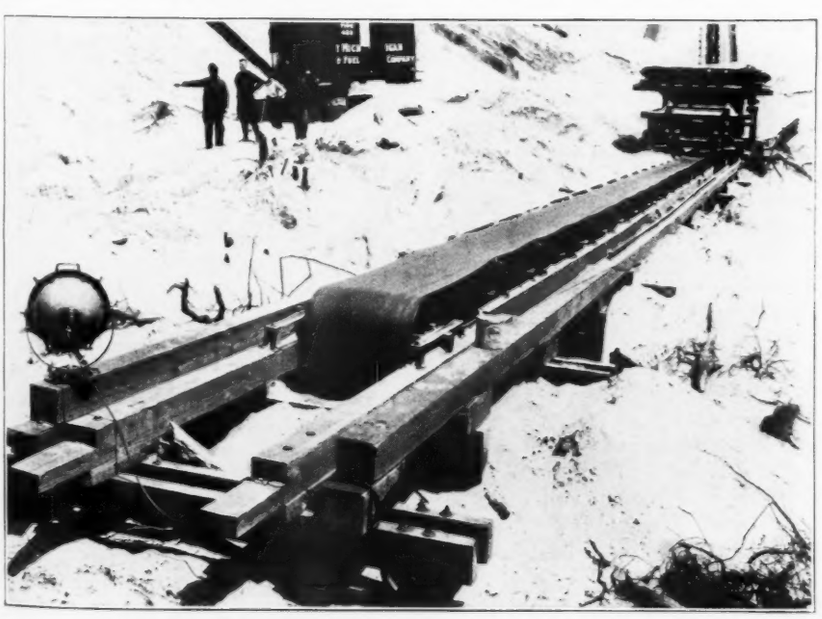
The belt conveyor long ago proved its superiority in transporting cheaply, material suitable for a belt conveyor. Most conveyors, however, have been used in permanent installations, protected from weather and with steel frame work.



Movable Timber Hopper Over Belt Conveyor

The Stephens-Adamson Manufacturing Company has recently brought out a movable type of belt conveyor installation which has a timber frame work and can be moved to project in any horizontal direction from the discharge end which remains fixed. This belt conveyor is 30 inches wide and 141 feet long and takes the discharge from a clamshell excavator. By clearing the path with the clamshell excavator, the conveyor may be moved so as to follow the clamshell excavator and thus allow of a large area being handled by the excavator.

A movable hopper is mounted over the conveyor belt, receiving the intermittent discharges from the clamshell bucket and feeding regularly and continuously to the belt. The frame work for the conveyor and the hopper are both built of timber and the whole thing is completely exposed to the weather. The illustrations show the hopper and the conveyor from its loading end, showing the flanged wheels on which the outer end may be rolled.

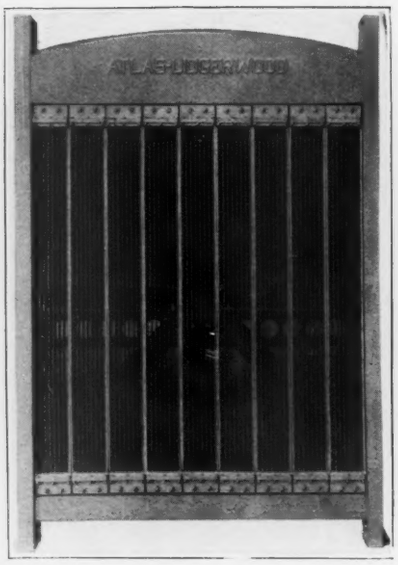


Tail End of Movable Belt Conveyor and Hopper

A New Heavy Duty Radiator

As indicative of the strides being made in the design and manufacture of radiators, a new type of large heavy duty radiator for unusually large Diesel and oil engines is shown by the accompanying illustration. This radiator is of the sturdiest construction known, with heavy structural steel sides, cast iron top and botom tanks, all built in proportion to the work and strains it is subjected to in the excavator, dragline, shovel, logging, oilfield and other work of this type.

This unit, recently announced by the Young Radiator Company, cools a 200 h.p. Atlas Imperial Diesel engine, has fan mounted direct on radiator, making it an integral part of the



A Heavy Duty Radiator

radiator and relieving it of vibration. The core construction is worthy of particular note inasmuch as the side members of the core sections are of patented design, eliminating vibration and "shimmying" of these parts and consequent leakage and failure. The tubes are larger than ordinarily used so that a large volume of water may be passed through the cores and eliminating all restrictions and possible clogging. This feature is very important for the extra large size radiators. These radiators are made in various capacities and sizes suitable for all sizes or makes of Diesels, stationary or portable, for export or domestic use in temperate or tropical climates.

New Tramway Developed

The Riblet Tramway Company of Spokane, Washington, has recently designed and is installing a new type of tramway bucket especially adapted to the handling of quarry run rock as well as crushed rock in capacities up to 200 tons per hour. One of these tramways has been installed on the property of the Northwestern Portland Cement Company which has a capacity of 100 tons per hour and handles quarry run rock.

Tramway Terminal, Northwestern Cement Company Plant

The buckets are self-dumping and are provided with double trucks which permit carrying greater loads and also permits the carriers to run at much higher speed around curves and terminals, thereby increasing the capacity of the tramway with the same equipment. The double grips insure safety against runaways on the heaviest possible grades on which the tramways can operate steel and concrete foundations. The system of fabricating and standardizing structural members has enabled the Riblet Tramway Company to install steel tramways at a low cost.

Large Compartment Mill Of Advanced Design

An outstanding achievement is the building of the new 8 by 7 by 50 feet three compartment mill for clinker by The Traylor Engineering and Manufacturing Company. The mill is built with compartments 12 feet, 14 feet and 24 feet respectively with the well known Traylor patented partition and discharge diaphragms.

The feed end of the mill is carried on a locomotive steel, riding ring shrunk in place on a cast steel support casting which is riveted to the shell, and resting on two hard cast steel rollers of ample size. The discharge end is carried by an oversize trunnion which is a separate casting securely riveted to the discharge head.

The supporting rollers for the feed end of the mill are fitted with Timken roller bearings which are mounted in adapters, the adapters in turn being assembled with semi-steel pedestal bearings. The pedestal bearings are designed with lubrication chambers and extra precautions are used to confine the lubricant and exclude grit and dust. Alemite connections are provided for lubricating.

The bearings are accurately planed to fit a heavy cast steel sole plate and for adjustment there are provided extra heavy set screws working in plugs set in the sole plate casting. These plugs may be removed, permitting the withdrawal of the pedestals from underneath the mill.

The discharge end trunnion is turned accurately for assembly with an extra sturdy Timken bearing which carries this end of the mill. The Timken bearing is mounted in an extra heavy pedestal, secured in place by adapters, and the bearing is thoroughly protected against the entry of grit and loss of lubricant by special sealing rings designed with labyrinth grooves, and felt packing. The pedestal is of the ball and socket type and is mounted on a heavy sole plate. The sole plate is wedge adjusted.

Tramway at Plant of North Western Cement Company

A New Compartment Mill

A pump, cooler and filter are provided for continually supplying fresh lubricant to the bearing. About two gallons of oil are required for the purpose.

The drive is single reduction and consists of a high carbon cast steel girth gear with involute cut teeth meshing with a tool steel pinion, both completely housed to render it dust tight, with the lower part, which protects the pinion, forming an oil reservoir, in which the pinion runs.

The main countershaft is mounted in two Timken bearings, and two additional Timken bearings are provided for the shaft extension to the motor. The shaft extension is fitted with one flexible coupling and one solid coupling.

The mill is fitted with an outside screen for returning oversize, passing through the partition diaphragm back to the coarse compartment. The device, at the same time, discharges the fines into the intermediate compartment through four ports in the diaphragm frame.

A suitable cast steel spout is provided for feeding the mill and a specially designed seal which closely fits the spout effectively prevents the escape of dust from the mill.

The discharge trunnion is fitted with a conical screen and completely enclosing same in a dust proof manner is a heavy steel housing with separate discharges for finished and broken balls which may escape from the mill.

The illustration gives an idea of this mill, which weighs complete, empty, about 350,000 pounds, exclusive of motor, and when charged with balls and material to be ground, nearly 600,000 pounds. The mill is driven by a 900 horse power motor, operates at about 21 r.p.m. and has a capacity of approximately 100 barrels of cement.

Traylor Table Feeder

Among the improved devices developed by The Traylor Engineering and Manufacturing Company during 1928 is the new table feeder for cement grinding mills, which is shown in the illustration.

The feeder is designed with a cast iron base, the top of which is formed with a driving gear chamber, which is closed so as to be oil tight and dust proof by the housing in which the revolving table works. The housing is designed with a high annular flange and is provided with a suitable discharge spout.

The revolving table is made of cast iron, and is designed with a hub which is bored to receive the vertical shaft upon which it is pivoted. The table is made with three seal rings, engaging rings cast integral with the housing, to prevent dust or grit from entering the driving gear chamber. The top of the table is protected by a heavy, renewable steel wearing plate.

The housing is designed with a hub which is bored and brass bushed for the table shaft, and the bottom of the housing is accurately machined for an absolutely tight fit to the top of the base casting, in order to make the gear chamber thus completely enclosed, dust proof and oil tight.

The base casting is likewise machined to receive the housing and in the bottom of the gear chamber is fitted a Timken bearing to receive the lower end of the table shaft and take its thrust. The base casting is also machined to receive two bronze bushed bearings which support the worm shaft of the drive, one of which bearings is fitted with a ball thrust.

The feeder is worm driven, the worm wheel being of special bronze with the teeth hobbed out of the solid, and the worm is of forged steel, hardened cast with a double thread. The worm is integral with the shaft, which is extended at both ends so that the feeder may be driven from either side. The ratio is fifty to one, making it possible to drive the feeder from a small motor, a silent chain or a single set of gears. The power required is very small.

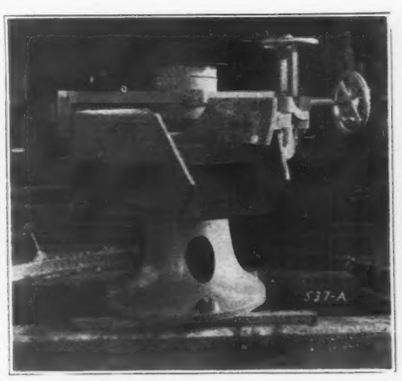
The feeder is provided with a swinging scraper, made of hard iron and carefully ground on the bottom to fit the table. It is fitted with a screw adjustment which is always covered to protect it from grit, thus assuring easy operation.

A telescopic steel feed pipe is used to regulate the amount of material resting on the table, being provided with an operating lever, hand wheel and screw, and a stationary nozzle, enabling complete control at all times.

The lubrication is thorough, the gear chamber being filled with oil, while the upper bearing of the worm gear shaft has a separate grease pipe and cup. Provision is made for periodic draining of the lubricant in the gear chamber. The feeder is a most complete mechanism and entirely self contained, and is of such design, with the various adjustment provisions, that it has a very wide range of capacity.

New Safety Device For Bulldog Jaw Crusher

This device, by the Traylor Engineering and Manufacturing Company, shown by the illustration, consists primarily of a punch actuated by the eccentric or pitman shaft of the crusher, and a punching bar, through which the punch is driven when excessive strains are developed. The punch is held in position by a plunger working in the body of the saddle of the pitman, and in contact with a roller attached to the back end of the front toggle. A die of hardened tool steel is placed below the punching bar which is of ordinary bar steel and which is sufficiently strong to take all of the crushing strain in normal operation.



A Table Feeder

A Safety Device

The safety device functions when dangerous strains are developed through packing or other obstructions in the discharge opening of the crusher. When the yielding point is reached the punch is driven through the punching bar by a heavy downward pressure excited by the front toggle, through the plunger roller, upon the plunger, which carries the punch. Thereupon the slug that is punched out falls out of the pitman rocker and the toggles drop, the back end of the front toggle falling until it is stopped by and rests upon the two adjusting bolts of the two toggle supports, one of which is bolted to each side of the crusher frame.

The stops serve to prevent the toggles from dropping down below a limited distance so that the motion of the actuating device is less than the clearance of the mechanism after the safety device has functioned. Crushing immediately ceases because the clearance between the plunger and the plunger roller is greater than the total vertical stroke of the pitman. The pitman continues to work but instead of lifting the toggles to move the swing jaw forward, it simply works up and down on the plunger, the punch passing through the hole perforated in the punching bar.

This safety device is very simple and positive in action, as well as being highly economical to maintain, since the parts are subject to but little wear, except the punching bar which may be replaced at negligible cost. Moreover little time is lost in making of readjustment, as if the necessary jack and wrenches are kept handy the punching bar may be moved over to a new position in about five minutes.

At all points of pressure there is nothing but rolling contact. This means that power losses are similar to those in a ball bearing of similar proportion running under full load.

Practical tests have shown that the efficiency averages over 95 per cent of their full rated capacities.

The standard machines are made in sizes to transmit ⅛ to 20 h.p. at the maximum reduction and will provide a range of speed variation of about 5 to 1. For example, if the input speed is 1800 r.p.m., the output shaft will have a maximum speed of 1000 r.p.m. and a minimum speed of 200 r.p.m. The speed variation is without interruption and is of especial value where a smooth control regulation is desired.

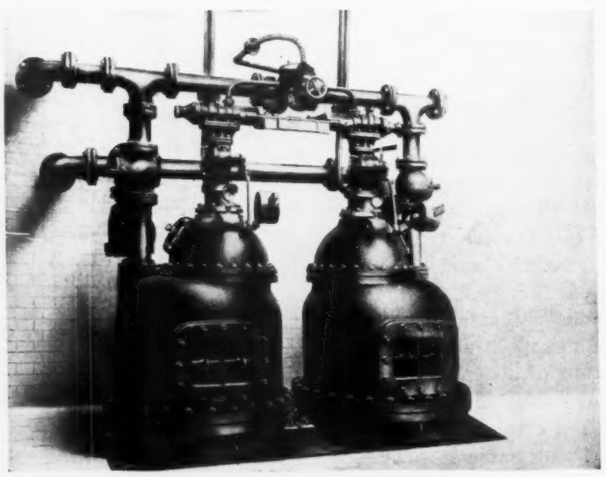
These speed changes are being used to regulate the speeds of feeders, conveyors, heat treating furnaces, oven conveyors and many other places where it is desirable to regulate operating speeds.

Pneumatic Transportation Of Cement Slurry

The solid materials composing cement slurrys vary considerably in physical characteristics. Some are soft and smooth. Others may contain a considerable amount of grit. There is no uniformity in specific gravity. The amount of water required to maintain the finely divided solids in suspension and permit their ready transportation, is also a variable quantity.

It is accordingly evident that a means for transporting cement slurry must operate through a wide range of conditions if it is to satisfactorily meet the many variables encountered.

The Polysius double pressor pumps slurry through pipe lines by means of compressed air. It consists of two parallel vertical receivers with individual compressed air controls mounted above each receiver. These controls are interconnected and are actuated alternately by a ball float in each receiver. The slurry inlet and outlet pipes are at the bottoms of the respective receivers which are tapered at this point to prevent the accumulation of inert matter.



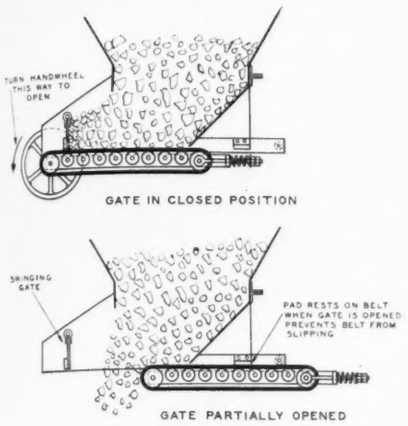
The Pressor

The flow of slurry from the double pressor is continuous. While slurry is flowing by gravity into one of the receivers, which during the filling cycle has been automatically disconnected from the compressed air supply, it is being forced out of the other receiver by compressed air which has been automatically admitted to that receiver. The alternate connection of the two receivers to the sources of slurry and compressed air supply are so nicely synchronized that the flow of slurry from the double pressor is continuous. Furthermore, the compressed air which displaces the slurry from the pressor receivers follows the stream of slurry through the transport pipe lines thus effectively keeping these pipe lines clear and preventing the return of any slurry to the receivers.

The compressed air control for each receiver is regulated by a pilot valve consisting of a balanced cylindrical two-way cock mounted above each receiver. This cock admits air to either of the two ends of a horizontal companion piston valve which in turn opens or closes the air ducts leading to the receiver. While compressed air is being admitted to one receiver, the other receiver is automatically opened to the atmosphere thus avoiding air traps and ensuring a steady flow of slurry to the receiver while it is obtaining its charge of slurry.

All the air control mechanism is outside of the receivers and does not come in contact with the slurry being transported. The action of the pressors is automatic and they require little attention and practically no repairs.

Double pressors are generally installed so that the slurry flows to them by gravity. They will transport slurry economically with a minimum amount of supervision and without detention of any kind through pipe lines of any length and height required to serve the different departments of a cement plant.


TURN HANDWHEEL THIS WAY TO OPEN
GATE IN CLOSED POSITION
SWINGING GATE
PAD RESTS ON BELT WHEN GATE IS OPENED PREVENTS BELT FROM SLIPPING
GATE PARTIALLY OPENED

A Frictionless Bin Gate

A Bin Gate Development

The Moore Bin Gate, manufactured by Stephens-Adamson Manufacturing Company, is used on large bin and hopper bottoms to regulate the discharge of material to cars, feeders, conveyors, etc., below.

In operation the gate is unique. Instead of a steel plate which must be dragged from under the load to open and close the gate, a small belt conveyor has been substituted. As shown in the accompanying illustration, the load rests directly upon the belt. The framework supporting this belt conveyor is suspended from overhead trolleys and tracks mounted upon each side. In this way the whole conveyor is free to move back and forth under the opening.

When the operator desires to open the gate he turns the hand wheel shown. The belt is held from moving by the load resting upon it and the reaction from the hand wheel causes the whole conveyor to move back from under the opening.

The action is simple but very effective. There is no friction between the material and belt and the gate is opened and closed with a mere fraction of the effort needed to open and close the usual gate. Very simply described, the belt is rolled from under the opening. It is built primarily for heavy duty and is suitable for any heavy or lump material. It is built for a variety of openings ranging from 24 inches by 30 inches up.

Improved Gayco Collector

The Rubert M. Gay Company, Inc., has during the past year, placed on the market a new and greatly improved air separator known as the Model 27 Gayco centrifugal. This machine embodies many improvements and refinements and is the result of the experience its engineers have gained in the eight years that the original Model 21 Gayco has been on the market.

The new model operates on the well known Gayco principle of separating by centrifugal force, not by gravity, generated in the particles to be separated by revolving vanes in the separating chamber.

The weight has been increased; angles and channels have been added to the outer shell to facilitate erection and prevent damage in transit; the angle of the conical section has been increased and flat shelves under the deflectors have been eliminated, consequently, there is no tendency for sticky materials to build up and choke the separator.

A new type of centrifugal fan of increased efficiency has been provided, and is so constructed that adjustments for finenesses between 60 and 325 mesh and finer can be made in five minutes without the use of tools. There is almost no limit to the fineness which may be obtained from this machine and it will reseparate the finest air or water floated material made by any other machine or process.

The new fan gives hundreds of combinations making possible changes as small as 0.5 per cent at the coarser meshes and as little as 0.1 per cent at the finer settings. Every adjustment is a fixed step which can be logged and returned to at any time.

When separators are to be used for abrasive materials such as cement, clinker, garnet, feldspar, etc., the separating chamber is fitted with replaceable liners. The efficiency of the circulating fan has been improved by a blade of new design, increasing the capacity of the machine.

The oiling system has been perfected and all waste of oil eliminated. The oil contained in a tank on top of the machine runs in streams through all the bearings, thrust bearing and over the gear teeth being collected in a pan like enlargement of the fan hub; a fixed scoop attached to the head projects into the oil in this enlarged portion of the hub and the centrifugal force generated in the oil gives it sufficient pressure to force it through the scoop and up the pipe to the tank where it is strained, cooled and continues its cycle.

No attention is required other than occasionally drawing off some of the old oil from the bottom of the tank and replacing it with fresh oil. There are no oil or grease cups to require constant attention, no oil can get into the product and no possibility of the bearings running dry.

The separator is provided with two large man-holes on the top 2 feet by 3 feet in size and another large manhole in the lower conical section making the interior easily accessible. This machine has no dampers or chokes and can be run at varying speeds without affecting the fineness of the product. The new Model 27 is built in eight sizes from 30 inches to 18 feet in diameter having capacities of from 100 pounds per hour to 40 tons or more.

An Improved Air Separator

New Spiral Pipe Joint

One of the developments during the past year has been the standardizing by spiral pipe manufacturers of the new flexible joint which has been used successfully on cast iron and lap-welded steel pipe but has not heretofore been available on spiral pipe.

This joint is the victaulic joint and the application of the joint to the pipe calls for a short section of pipe welded to the end of the spiral section, this short piece having a thick enough shell so that a groove can be cut in the short distance from the end. A similar groove is cut in the other pipe to be connected up.

The ends of the two pipes are brought together and this position a collar is placed about the two pipe ends, this collar consisting of two or four parts depending upon the diameter of the pipe. This collar fits in both of the grooves in the pipes being connected.

Inside of the collar is a rubber molded ring shaped in such a way that pressure inside the pipes or vacuum inside the pipes will seal the joint.

This pipe has considerable flexibility, can be easily connected up and disconnected, and has all the advantages of an ordinary flanged joint plus greater flexibility of a slip joint.

There are a great many places, therefore, where this type of joint can be used to advantage.

INTIMATE NEWS OF MEN AND PLANTS

Logansport Installs Washer

The Logansport Stone and Lime Company of Logansport, Indiana, is installing a new stone washer. The main offices of the company are at Huntington, Indiana.

Tonopah Installs Shovel

The New Tonopah Dividend Mining Company has installed a large shovel of 1000 cubic yard daily capacity. It plans to use conveying and excavating machinery to bring the plant up to 2000 yards per day. L. V. Ridley is president and general manager.

New California Stone Plant In Operation

The Calavera Rock Company recently began production at its new $75,000 crushed stone plant at Carlsbad, California. Distribution is to be by truck. The quarry is located in the crater of the extinct Calavera volcano. Lee Walker and Tom F. Collins are in charge.

Wyoming Cement Plant Near Completion

The new $2,000,000 plant of the Monolith Portland Midwest Company at Laramie, Wyoming, is being rushed to completion and will be in operation this month according to W. S. Trueblood, production manager. Operations will be started with a capacity of about 2000 barrels of cement daily. When in full operation the plant will have an annual production of between 500,000 and 600,000 barrels. When this plant is completed work will begin on plans for another plant on Harbor Island, near Corpus Christi, Texas.

Massachusetts Gypsum Plant Now in Operation

The new $1,000,000 plant of the U. S. Gypsum Company at Charlestown, Massachusetts, was put into operation recently when the first shipload of gypsum arrived. The steamer Gypsum Prince came in from Windsor, Nova Scotia, with a cargo of 5500 tons of crude gypsum.

Lewis Ingalls Elected

The board of directors of the Ingalls Stone Company of Bedford, Indiana, at a recent meeting elected Lewis Ingalls president. He succeeds his father, the late Charles C. Ingalls, and has been in charge of operations a large part of the time for the past few years.

Penn-Dixie Appoints General Sales Manager

The Pennsylvania-Dixie Cement Corporation announces the recent appointment of Walter S. Wing as general sales manager. In his new position Mr. Wing will be in general charge of the marketing of the Corporation's products and will be located at 131 East 46th Street, New York City.

Mr. Wing graduated from Cornell University with the degree of Mechanical Engineer in 1907 and in that summer entered the steel business in Pittsburgh, obtaining employment with a subsidiary of the United States Steel Corporation. About 1908 he was transferred to another subsidiary, the Universal Portland Cement Company, by which company he has been employed until recently. The last 13 years he served the Universal Company as Eastern sales manager with his office in Pittsburgh.

Mr. Wing has always been interested in public and civic affairs and was an active member of the United States Chamber of Commerce, Pennsylvania State Chamber of Commerce, Ohio State Chamber of Commerce, Pittsburgh Chamber of Commerce, and Civic Club of Allegheny County. He is also a member of the American Society for Testing Materials, Cornell Society of Engineers, and in Pittsburgh he is a member of the Duquesne Club, University Club, Longue Vue Club, Railway Club of Pittsburgh, Automobile Club of Pittsburgh, Pittsburgh Builders Exchange and others.

United States Gypsum Co. Enters Metal Lath Field

Metal lath of all types and metal lath accessories have been added to the line of commodities distributed by the United States Gypsum Company, according to an announcement from the company headquarters at Chicago. The company's Red Top brand will be used on all metal lath products.

The addition of metal lath and accessories to the U. S. G. line, according to the announcement, is another step in the company policy of giving its dealers and the building industry the utmost service as regards convenience of supply and rapidity of delivery of the commodities it handles. The company now operates some 20 major manufactories in the United States, and at most of these metal lath will be stocked for shipment to the trade in cars also containing gypsum, lime and others of the company's products.

In charge of metal lath sales for the company is H. B. Spackman, formerly with the Northwestern Expanded Metal Company, and more recently with the Milwaukee Corrugating Company. Mr. Spackman will headquarter at the company's general offices in Chicago.

Oregon Pit Resumes

The Von Der Hellen sand and gravel plant on the Rouge River near Gold Hill, Oregon, has resumed operation after being shut down for several months. The product is used largely as road gravel.

Pennsylvania Cement Plant Makes Improvements

The Sandusky Portland Cement Company is to install a dust-collecting system in its West York, Pennsylvania, plant at a cost of approximately $100,000. The precipitator, which will be of the high voltage electrical type, is to be made and installed by the Western Precipitation Company.

Fire Destroys Ohio Plant

The South Amherst, Ohio, plant of the Ohio Cut Stone Company was recently destroyed by fire of undetermined origin. The damage is estimated to be about $200,000 and was partially covered by insurance. Among the equipment destroyed were two automatic cranes, five planers, two circular saws, three lathes, a gang saw and many smaller items. Thousands of dollars worth of cut stone awating shipment was also destroyed.

California Lime Company Moves Offices

The Oro Grande Lime and Stone Company which for the last eight years has had general offices in the Douglas building, Los Angeles, California, has moved these offices to 341 Foothill Road, Beverly Hills. The new office building was built three years ago but it was not found desirable to move the offices until now.

Tennessee Firm Moves

The Tennessee Cement and Lime Company recently moved its general offices from Murfreesboro, Tennessee, to Summitville, where the plant and quarry are located. R. C. Miller, plant manager, is in charge.

DIST[illegible] CEMENT

The following figures show s[illegible]m Portland cement mills distributed among the states to which cement was shipped during September and October, 1927 and 1928.

Portland cement shipped from mills into States in September and October, 1927 and 1928, in barrels

Shipped to—	September		October	
	1927	1928	1927	1928
Alabama	229,592	255,120	268,221	226,835
Alaska	742	277	0	132
Arizona	38,589	56,940	40,461	60,063
Arkansas	87,996	136,794	92,180	126,798
California	1,114,333	1,020,406	1,170,744	1,145,337
Colorado	107,896	140,150	120,300	114,600
Connecticut	257,188	233,257	214,120	259,374
Delaware	58,667	34,578	34,107	73,582
District of Columbia	100,626	81,703	97,408	133,450
Florida	152,129	98,859	153,713	142,911
Georgia	149,740	155,421	153,271	180,537
Hawaii	11,790	21,378	23,201	34,436
Idaho	29,588	30,886	32,774	28,253
Illinois	1,902,780	2,553,958	1,892,207	2,130,249
Indiana	807,523	847,440	701,944	658,331
Iowa	563,779	738,450	527,340	442,740
Kansas	261,769	272,461	305,427	316,943
Kentucky	245,577	211,690	223,764	203,725
Louisiana	129,457	112,202	131,902	106,819
Maine	63,493	79,289	49,167	72,694
Maryland	285,248	227,573	258,427	307,849
Massachusetts	310,562	315,939	302,248	337,880
Michigan	1,459,078	1,692,432	1,270,331	1,449,956
Minnesota	414,197	377,096	345,054	306,698
Mississippi	92,276	129,970	105,002	133,253
Missouri	489,155	554,767	502,478	583,508
Montana	43,797	59,124	35,507	52,977
Nebraska	195,109	159,659	207,301	174,041
Nevada	4,845	13,635	5,381	9,954
New Hampshire	66,537	72,947	53,052	73,003
New Jersey	960,390	884,759	870,585	1,064,536
New Mexico	23,103	27,552	29,552	37,837
New York	2,703,962	2,398,193	2,119,748	2,445,879
North Carolina	303,283	167,910	302,904	238,528
North Dakota	35,938	43,739	27,700	41,390
Ohio	1,406,311	1,410,196	1,284,751	1,312,086
Oklahoma	329,676	361,360	301,163	314,273
Oregon	127,909	132,521	122,443	120,863
Pennsylvania	1,683,405	1,519,073	1,413,406	1,651,472
Porto Rico	.....	500	500	.....
Rhode Island	76,597	77,316	71,567	87,953
South Carolina	100,262	108,575	112,445	154,004
South Dakota	56,882	58,274	57,753	52,621
Tennessee	253,945	353,282	231,850	344,413
Texas	449,994	515,419	523,015	564,578
Utah	43,021	49,468	41,022	51,793
Vermont	71,529	108,095	52,392	107,388
Virginia	197,320	173,104	181,685	220,617
Washington	264,748	291,994	220,784	261,412
West Virginia	250,542	166,816	205,074	170,134
Wisconsin	711,004	791,171	541,528	622,618
Wyoming	19,223	27,555	15,102	17,682
Unspecified	38,980	41,593	1,954	8,545
	19,782,082	20,392,866	18,045,955	19,777,550
Foreign Countries	45,918	67,134	59,045	58,450
Total shipped from cement plants	19,828,000	20,460,000	18,105,000	19,836,000

Relation of Production to Capacity

	November		October	September	August
	1928	1927	1928	1928	1928
	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
The month	77.4	75.9	87.1	91.7	93.1
The 12 months ended	74.1	73.7	73.8	73.7	73.5

Production and stocks of clinker, by months, in 1927 and 1928. (In thousands of barrels)

Month	Production		Stock end of month		Month	Production		Stock end of month	
	1927	1928	1927	1928		1927	1928	1927	1928
January	10,410	11,839	9,989	9,672	July	15,697	15,981	9,609	11,707
February	9,253	11,363	11,943	12,237	August	16,396	16,202	7,887	9,357
March	12,397	12,501	12,997	14,463	September	15,931	15,909	6,490	7,566
April	14,246	13,844	13,335	15,002	October	16,469	15,782	5,960	5,944
May	15,677	16,025	12,514	14,329	November	14,698	14,930	6,374	5,953
June	15,437	15,940	10,926	12,944	December	13,177	.....	7,660	.....

Production, shipments, and stocks of finished Portland cement, by months, in 1927 and 1928. (In thousands of barrels)

Month	Production		Shipments		Stocks at end of month	
	1927	1928	1927	1928	1927	1928
January	8,258	9,768	5,968	6,541	22,914	25,116
February	7,377	8,797	6,731	6,563	23,563	27,349
March	11,450	10,223	11,100	10,135	23,922	27,445
April	14,048	13,468	14,350	13,307	23,654	27,627
May	16,701	17,280	16,865	18,986	23,503	25,984
June	17,224	17,469	19,761	18,421	20,972	25,029
July	17,408	17,445	18,984	19,901	19,397	22,580
August	18,345	18,730	21,411	21,970	16,292	19,374
September	17,505	17,856	19,828	20,460	13,996	16,799
October	17,174	17,533	18,105	19,836	13,141	14,579
November	14,449	15,068	11,619	11,951	16,022	17,696
December	11,999	.....	6,200	.....	22,082	.....
	171,908	.....	170,922	.....	.....	.....

CEMENT STATISTICS FOR NOVEMBER

The Portland cement industry in November, 1928, produced 15,068,000 barrels, shipped 11,951,000 barrels from the mills, and had in stock at the end of the month 17,696,000 barrels, according to the United States Bureau of Mines, Department of Commerce. The production of Portland cement in November, 1928, showed an increase of 4.3 per cent and shipments an increase of 2.9 per cent, as compared with November, 1927. Portland cement stocks at the mills were 10.4 per cent higher than a year ago. The total production from January to November, 1928, inclusive, amounts to 163,637,000 barrels, compared with 159,909,000 barrels in the same period of 1927, and the total shipments from January to November, 1928, inclusive, amount to 168,071,000 barrels, compared with 164,722,000 barrels in the same period of 1927.

The statistics here presented are compiled from reports for November from all manufacturing plants except two for which estimates have been included in lieu of actual returns.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 159 plants at the close of November, 1928, and of 154 plants at the close of November, 1927.

New Corporations

Acme Sand & Gravel Co., 312 Oak St., Portland, Ore. $85,000. Dredging operation. M. E. Patterson, Pres.; Elmer Banks, Sec.-Treas.

Silica Asphalt Corp., % T. A. Doherty, Queens Village, N. Y. $10,000.

Los Angeles Portland Cement Co., % Gibson, Dunn & Crutcher, Attorneys, 1111 Merchants National Bank Bldg., Los Angeles, Calif. $1,600,000; 30,000 shares com.

Lime Sales Corp., Staunton, Va. $50,000. M. H. Lambert, Pres.

Coldwater Crushed Stone Co., Coldwater, Ont., Can. 1,000 shares pfd., $100 each; 10,200 shares n. p. v.

Charlotte Stone Co., nr. Salisbury Rd., Charlotte, N. C. $75,000. Geo. H. Moore, Vaughan Hawkins, R. H. Proctor, A. L. Simpson.

Pacific Aggregates, San Francisco, Calif. 1,200,000 shares n. p. v. Reported to be merger of several California quarry, cement, gravel, and sand companies. Directors: Ernesta Costelli, Pauline Whitman, Oakland; Leo C. Brumm, Alameda; L. H. Castlio, Berkeley; W. Frank Garby, San Francisco; D. McIntyre, Piedmont.

Associated Sand & Gravel Co., % Corp. Guar. & Trust Co., Wilmington, Del. $25,000.

Sand-Man Co., Davenport, Iowa. $100,000. D. S. Block, Pres.; H. I. Scott, Sec.-Treas.

Intercity Sand & Gravel Co., 402 Northwest Bldg., Vancouver, B. C., Can. $50,000.

New Jersey Mineral Co., Geo. A. Cella, Trenton, N. J. $125,000.

Slack Line Dredging Co., Inc., Bellingham, Wash. $12,000. W. R. Allen, John German, J. L. Yelton.

Virginia Lime & Stone Products, Inc., Staunton, Va. 250 shares com. n. p. v.; $15,000 pfd. R. L. James, Pres. Will quarry limestone.

Interstate Sand & Gravel Corp., John Twohy, Pres., Norfolk, Va. 500 shares n. p. v. To quarry sand and gravel.

Ohio Slag Co., Ralph H. Carroll, 7509 Lexington Ave., Cleveland, O. 250 shares n. p. v. John H. Esmond, E. R. Smith.

General Dredging Co., Ft. Wayne, Ind. 1,500 shares n. p. v. Wm. G. Keane, Ray E. McCall, Leigh Hunt, Phil M. McNagny, F. B. Shoaff.

Kentucky Silica Co., Inc., % Corp. Trust Co. of Amer., Wilmington, Del. 1,000 shares com.

Divie Soapstone Products Corp., Arrington, Va. $200,000. Frederick J. Kandt, Pres., New York City. To quarry soapstone. Attorneys, Caskie, Frost & Coleman, Lynchburg, Va.

Chattanooga Stone & Marble Co., Chattanooga, Tenn. $15,000. Edwin Finley, E. J. Hamilton, Lillian Donovan, F. M. Payne, J. A. Sherrill.

Evans Gravel Surfacing Co., Ltd., Saskatoon, Sask., Can. $20,000.

Plan Louisiana Plant

J. P. Frain, Kokomo, Indiana, and Walter Green, Franklinton, Louisiana, have leased 575 acres of land near Brookhaven, Louisiana, and intend to produce crushed stone and sand and gravel.

Tennessee Plant to Enlarge

The Estill Springs Sand and Gravel Corporation, of Estill Springs, Tennessee, plans to enlarge its plant and increase production to about 40 cars per day. Meade Frierson is president of the corporation.

New Hampshire Feldspar Plant Planned

The American Mineral Products Company, Inc., Cold Village, New Hampshire, recently awarded the contract for the construction of a new feldspar grinding plant. Construction of the plant, which is to be 60 by 230 feet, has already been started.

EXPORTS AND IMPORTS

Compiled from the records of the Bureau of Foreign and Domestic Commerce and subject to revision

Exports of hydraulic cement by countries in October, 1928

Exported to—	Barrels	Value
Canada	4,921	$22,621
Central America	1,842	5,280
Cuba	5,194	15,855
Other West Indies	8,381	19,053
Mexico	7,089	23,644
South America	25,091	102,307
Other countries	9,619	57,250
	62,137	246,010

Imports of hydraulic cement by countries, and by districts, in October, 1928

Imported from—	District into which imported	Barrels	Value
Belgium	Florida	987	$ 1,013
	Galveston	3,500	3,988
	Los Angeles	510	615
	Massachusetts	34,124	56,877
	New Orleans	2,489	4,034
	New York	12,500	18,575
	North Carolina	21,036	35,179
	Rhode Island	17,750	23,349
	Sabine	1,500	2,850
	South Carolina	20,000	24,146
	Total	114,396	170,626
Canada	Maine and New Hampshire	4,015	9,148
	New York	10,106	15,649
	Philadelphia	2,724	5,149
	San Francisco	3	17
	Total	16,848	29,963
Denmark	New York	9,124	9,500
	Porto Rico	9,356	11,583
	Total	18,480	21,083
France	New York	998	2,200
Germany	Los Angeles	1,485	3,003
Irish Free State	New York	3	34
	Grand Total	152,210	226,909

Exports and imports of hydraulic cement, by months, in 1927 and 1928

	Exports				Imports			
	1927		1928		1927		1928	
Month	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
January	75,346	$254,072	56,400	$204,875	193,175	$269,661	234,753	$342,797
February	71,404	233,985	62,828	221,620	130,421	200,680	164,408	217,525
March	67,956	240,165	74,983	265,719	181,145	261,519	235,930	330,074
April	72,383	243,832	61,676	205,882	192,318	313,262	249,458	324,371
May	59,332	205,574	70,173	236,005	178,929	263,618	190,509	256,872
June	69,205	237,281	59,536	201,313	129,111	201,682	266,537	359,637
July	72,337	249,737	83,759	291,055	175,042	249,665	112,887	151,877
August	61,371	209,198	88,736	302,866	117,605	170,167	259,988	358,858
September	57,890	207,817	71,995	252,843	233,066	304,796	173,439	226,295
October	67,639	230,668	62,137	246,010	221,274	321,777	152,210	226,909
November	79,764	257,428	.....	.....	141,485	190,419	.....	.....
December	62,099	226,960	.....	.....	156,609	209,205	.....	.....
	816,726	2,796,717	.....	.....	2,050,180	2,956,451	.....	.....

Domestic hydraulic cement shipped to Alaska, Hawaii, and Porto Rico, in October, 1928

	Barrels	Value
Alaska	816	$ 2,592
Hawaii	25,948	59,124
Porto Rico	4,625	11,298
	31,389	73,014

Production, shipments, and stocks of finished Portland cement, by districts, in November, 1927 and 1928, and stocks in October, 1928. (In thousands of barrels)

	November						Stocks at end of October,
	Production		Shipments		Stocks at end of month		
District	1927	1928	1927	1928	1927	1928	1928
Eastern Pa., N. J., and Md.	3,345	3,338	3,008	3,153	3,765	4,196	4,011
New York and Maine	804	962	741	725	1,205	1,339	1,102
Ohio, Western Pa. and W. Va.	1,542	1,587	986	1,133	2,069	2,439	1,985
Michigan	1,181	1,409	757	811	1,501	1,355	757
Wis., Ill., Ind. and Ky.	1,909	1,973	1,284	1,272	1,512	1,624	924
Va., Tenn., Ala., Ga., Fla. and La.	1,452	1,413	1,325	1,350	1,304	1,683	1,619
Eastern Mo., Iowa, Minn. and S. Dak.	1,411	1,283	677	777	1,724	1,972	1,466
Western Mo., Neb., Kan. and Okla.	883	884	830	726	1,265	1,150	993
Texas	525	529	543	451	252	424	346
Colo., Mont and Utah	176	238	175	145	315	398	304
California	1,048	1,173	1,103	1,103	776	757	687
Ore. and Wash.	173	279	190	305	334	359	385
	14,449	15,068	11,619	11,951	16,022	17,696	14,57

NEWS OF EQUIPMENT MANUFACTURERS

New Seaverns Bin

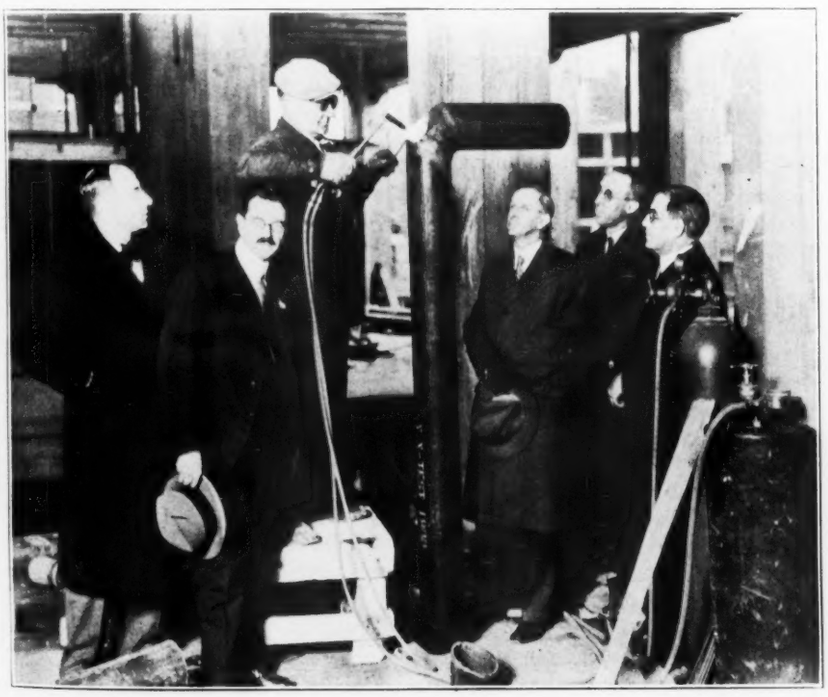
The new 50 yard TYPE "R" Bin recently brought out by the James B. Seaverns Company has several advantages over the TYPE "S" Bin so commonly used for material yards in that it is practically assembled at the factory in one unit. The legs are shipped unbolted, also the short knee braces, which can readily be attached by the men unloading the bin upon arrival at the job. The bin instead of being 12 by 12 feet, which was formerly shipped knocked down, is now 10 by 15 feet rectangular and shipped assembled on standard flat cars. They are 21 feet high when set up for 9 feet truck clearance. Provision is made for two 15 by 15 inch Seaverns patent clamshell gates for the self clearing bottom. Batch measuring hoppers can be attached for batch work as holes are provided at the factory should they be desired.

Cutler-Hammer Moves Atlanta Office

On December 1, the Atlanta office of The Cutler-Hammer Manufacturing Company was moved into new quarters at 150 Peters Street, S. W., Atlanta, Georgia. In addition to sales and engineering service on motor control apparatus and wiring devices, the new location provides warehouse facilities where many types of standard devices will be carried in stock for direct shipment to customers in that territory. This service has been provided to anticipate the requirements of Cutler-Hammer customers because of the increasing electrical power application to industry in that section of the country. A. C. Gibson is manager in charge.

Behr With Boston Woven Hose and Rubber Company

Harrison J. Behr, formerly associated with the Mechanical Rubber Company of Cleveland, has joined the sales organization of the Boston Woven Hose and Rubber Company as a special field representative. Mr. Behr has had a lifelong experience in the rubber industry, having always specialized in heavy mechanical lines such as belting, hose and packing. He was for more than twelve years associated with the B. F. Goodrich Rubber Company of Akron, Ohio, and for the past seven years has been in the organization of the U. S. Rubber Company operating through the Mechanical Rubber Division at Cleveland.



Left to Right: J. I. Banash, Consulting Engineer and President of the American Institute of Safety Engineers; Prof. C. F. Keel, Director of the Swiss Acetylene Society; Prof. J. D. Hoffman, Purdue University; L. E. Ogden, President, International Acetylene Association; Prof. H. L. Whittemore, U. S. Bureau of Standards and Morehead Medalist 1928. These Officials and Guests of the International Acetylene Association Are Inspecting Welded Pipe in a Chicago Skyscraper, the First Office Building in the Country in Which All Piping, Both Steel and Brass, Including Fire Lines, High and Low Pressure Steam Lines and Water Lines Are Completely Oxy-Acetylene Welded.

Zelnicker Publishes Bulletin

The Walter L. Zelnicker Supply Company of St. Louis is distributing its new Bulletin No. 378. New and used machinery of all kinds for use in the industries are listed, together with a listing of rebuilt and tested machines. Among the numerous listings are boilers, hoists, cranes, buckets, derricks, engines and all classes of contractors' equipment.

Continental Declares Dividend

The regular meeting of the Board of Directors of Continental Motors Corporation approved the quarterly dividend of 20c per share, or at the rate of 80c per share per annum payable January 30 to stockholders of record January 15th.

A Slackline Cableway Hoist With Simplified Control

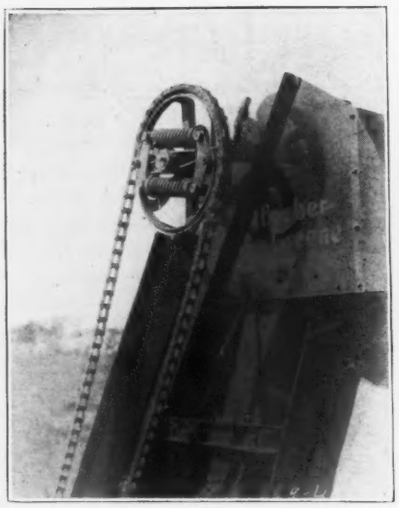
The O. K. Clutch and Machinery Company of Columbia, Pennsylvania, manufactures a two speed slackline cableway hoist, Type TSBD50, which is designed for handling sand, gravel, or other materials. This hoist is made with either gasoline or electric drive.

The rear drum, which handles the line tightening the track cable, has a constant speed. The front drum operates the bucket line, the low friction being engaged when filling or dumping the bucket and the high when the bucket is in motion. The bucket returns by gravity and is controlled by one of two foot brakes, the other controlling the lowering of the track cable. Two hand levers control the other operations.

Speed Reducer Catalog

The D. O. James Manufacturing Company, 1120 West Monroe St., Chicago, has just completed and published a 160 page speed reducer Catalog No. 166 which describes, illustrates and lists completely every type of speed reducer made by the company. This book should be of value to all engineers interested in speed reducers as it is written and compiled in a simple, concise, well illustrated form which makes for easy reference.

A copy of this 160 page catalog may be obtained by writing to the D. O. James Manufacturing Company.



New Overload Release Sprocket for Barber-Greene Loader

The Barber-Greene Company has just perfected an automatic overload release sprocket for its large and small bucket loaders, and coal loaders.

This release sprocket completely protects the machine against all strains on the bucket line and is infinitely superior to the "safety breaking bolt" which is the usual method of avoiding strains on such machines.

The sprocket, as the photos show, has two main elements—being namely the outside race and the inside springs. The chain runs around the sprocket teeth on the outside of the race. The race itself has two raised parts which are in contact with the two rollers of the springs. The spring part is keyed to the shaft. Ordinarily the pressure of the spring rollers against the raised part of the race is sufficient turn together—thus turning the head shaft and the bucket line. When a large boulder or any other big solid object tends to stop the bucket line, the springs compress—thus allowing the sprocket to run and the head shaft to stand still. Every half revolution thereafter the spring rollers come contact with the raised parts of the race and force is put on the bucket line. Usually this will free the object causing the trouble and the machine goes on running.

This is practically the same sprocket that has proven successful on the Barber-Greene vertical boom ditcher, and is a step over the "safety pin" as it does not hold the machine up even for the length of time required to fix a pin. It is a much better arrangement than the slipping clutch or belt, as there is no appreciable wear, and the whole power

of the machine is put on the bucket line every half revolution, after the bucket line is caught.

This safety release sprocket makes the Barber-Greene bucket loaders as completely protected as a loader can be. The disfeed which has been used on these bucket loaders for eleven years makes it impossible for material to become caught in the feeding device, the floating boom which takes the shock of going into the pile away from the boom, and now the release sprocket makes the protection of the machine complete.

Good Roads Builds New Crusher

The Good Roads Machinery Company, Inc., manufacturers and distributors of the Champion and Climax line of rock crushers, elevating and conveying equipment, screening, washing, and sizing equipment for the rock and sand and gravel industries, has announced among new advertising literature that will be ready for distribution during the month of December, will be a new and complete booklet titled "Sand and Gravel Equipment."

This is an eighty page catalog showing and describing the products of this company as applying to the sand and gravel industry of the country, and is complete and fully illustrated with many cuts showing installations of various capacity.

Quite recently its catalog titled "Rock Crushing Equipment" was issued which deals exclusively with the crushing and other machinery used in the prepared rock field.

During the past year the Good Roads Machinery Company, Inc., has released to the trade, after exhaustive tests, its new Champion roller bearing reduction crusher, in which SKF self aligning bearings are used throughout. The orders reported received to date for these crushers have far exceeded expectations, as they have proven unusually effective and economical in operation and maintenance, and many repeat orders have been received. Simplicity, compactness, strength and efficiency are the dominant characteristics of these crushers.

To date these crushers have been built in one size only, known as the No. 1030, with a jaw opening of 10 inches by 30 inches, but two other sizes will be added to complete the line, and announcement, together with details, will be published in a special bulletin now in preparation and also in the "Sand and Gravel Equipment" catalog now being printed.

The Good Roads Machinery Company, Inc., is one of the oldest manufacturers of jaw crushers in the country. The Champion and Climax rock crushers are widely and favorably known everywhere. During the coming Road Show at Cleveland its space will be in the West Wing—Space WW-61—where the machinery manufactured will be fully exhibited.

A Screw Rewasher

The Telsmith screw rewasher was designed this year primarily to supplement the Telsmith sand tank in pits where the sand contains so much dirt or fine sand that satisfactory results are not obtainable with a gravity tank. This rewasher consists of a cast steel screw journalled in an inclined metal trough. This trough is made of ¼ inch steel plate with heavy end castings of grey iron. The screw is made in sections, threaded upon a 2 15/16 inch shaft of cold rolled steel, which is driven by means of bevel gears at the upper end. At the lower end, the shaft is provided with a roller-bearing, completely housed, to take the end thrust. An adjustable stuffing box prevents leakage of water around the shaft. A flush chamber at the inner end of the bearing provides a counter-flow against the entry of dirt into the journal.

Because of its large water capacity, the Telsmith tank is recommended as the first sand recovery unit. On the other hand, the Rewasher dewaters more thoroughly and therefore is recommended to follow the tank, particularly where free water must be avoided, as in city haulage. The two equipments make an efficient team for sand recovery under difficult conditions.

Finishing Gyratory Crusher

A new 15 inch size gyratory crusher is added to its line by The Traylor Engineering and Manufacturing Company. This crusher weighs about 106,000 pounds and is driven by a 150 horse power motor, having capacities varying from 130 tons per hour to 1¾ inch ring size, to 225 tons per hour to 2¾ inch ring size.